DOCUMENT RESUME

ED 217 883 IR 010 269

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TITLE THINKABOUT in Wisconsin: Outcomes, Implementation, and Implications.
INSTITUTION Wisconsin Educational Communications Board, Madison.
PUB DATE Dec 81
NOTE 116p.

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Cognitive Processes; *Educational Television; Group Behavior; Intermediate Grades; Programing (Broadcast); Questionnaires; *Skill Development; *Student Reaction; Tables (Data); *Teacher Response
IDENTIFIERS *THINKABOUT

ABSTRACT

THINKABOUT, an ITV series for grades 5 and 6 designed to teach thinking skills, has been used in Wisconsin since 1979. The purposes of this study, conducted in spring 1981, were to identify teacher and student outcomes from using the series, ways of helping teachers to better implement THINKABOUT, means of expanding the use of THINKABOUT, and implications for the support and production of other ITV series. Fifty-eight teachers from a sample of teachers who used the series and who volunteered to be a part of the study completed a questionnaire. In addition, from each of six classes using THINKABOUT and two classes not using the series, three groups of four students each were observed as the groups worked together on four problems. The interactions among the students were recorded, transcribed, and analyzed. THINKABOUT was well received by teachers and students. There was evidence that the series was successfully related to strengthening self-expression and facets of managing one's own learning and flexible thinking. Although thinking skills were not observed being used regularly in all groups using the series, their use appeared to be related to the time spent with follow-up classroom activities. (Author)

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THINKABOUT in Wisconsin: Outcomes, Implementation, and Implications

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December 1981

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IR010269

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SUMMARY

The main purpose of the study was to provide information that could be used to make decisions about instructional support for THINKABOUT in Wisconsin and for future instructional television series. The study was designed to identify teacher and student outcomes from using THINKABOUT, needs of teachers to help them better implement THINKABOUT, means of expanding the use of THINKABOUT, and implications for the support and production of other ITV series. The sources of data were teacher questionnaires, teacher telephone interviews, student questionnaires, and student responses to four problems. The population of teachers from which all participants and their students were part of, were 95 teachers of a random sample of 800 Wisconsin fifth and sixth grade teachers who volunteered to be in a follow-up study of THINKABOUT. From this group, 58 teachers who were using THINKABOUT returned a questionnaire, nine teachers were interviewed by telephone to validate the questonnaire information, seven teachers who had used THINKABOUT the previous year but were not using it during the 1980-81 school year returned a questionnaire, five teachers returned questionnaires completed by five or six of their students, and eight of the teachers allowed three groups of four students each to be observed as each group worked four problems. Two of the eight classes had not viewed any programs from THINKABOUT. All of the data was collected during Spring 1981. The three groups of students who were interviewed from each class were selected randomly from the class. As the groups attempted the four problems, the responses of the students were recorded on audio cassettes. After completing work on the problems, each group was interviewed.

Approximately one-fourth of the grade 5 and grade 6 teachers in Wisconsin were projected to be using THINKABOUT during the 1980-81 school year. The average amount of time a week spent on related activities to THINKABOUT was 48 minutes--

30 minutes viewing the programs, 6 minutes in pre-activities, and 12 minutes in discussion following the programs. Only one-third of the teachers did some other in-class assignment. Teachers and students were very positive toward THINKABOUT. THINKABOUT appeared to be successfully related to strengthening the students' abilities to effectively express themselves, and to effecting some facets related to having students manage their own learning and to think flexibly. Evidence of the relation of THINKABOUT to strengthen systematic reasoning was not substantiated by all sources of information. Students were able to recall very well the stories from the programs, however students who applied the ideas in the programs were those who had done more related classroom activities. In general, THINKABOUT did appear to supplement the growth in students of problem solving and independent learning.

Even though only a third of the teachers expressed interest in attending an in-service, there were indications that teachers would benefit from an in-service because of the small amount of time spent on classroom activities related to THINKABOUT. Any in-service would have to respond to the critical concern of teachers of finding the time during the school day to plan and do THINKABOUT activities. A useful in-service would help teachers fit THINKABOUT activities into their basic curriculum. Two possible directions of expanding the use of THINKABOUT in Wisconsin are to teachers in schools where other teachers are using THINKABOUT and to teachers at schools where THINKABOUT is not being used. Each of these groups would have different needs and situations that should require different implementation procedures. Implications of THINKABOUT to other ITV series to be produced for grades 5 and 6 irclude using students at that age level, making situations relevant and believable, and using some related programs such as a serial. The story lines aided in recalling what the program was about, but follow-up classroom activities were important in having students apply the skills.

INTRODUCTION

One of the most extensive projects in instructional television culminated with the debut of the THINKABOUT series in September 1979. A high priority was placed on fundamental learning skills by educators and broadcasters attending four regional meetings convened by the Agency for Instructional Television (AIT), the developer of THINKABOUT, during the Fall of 1973. This was the beginning of a project that eventually cost $5,700,000, involved 42 states and provinces as consortium members as of September 1981, and produced a series of sixty, 15-minute color programs for fifth and sixth graders. Wisconsin, with a history of supporting instructional television, was one of the 14 states who was a part of the THINKABOUT consortium from its formation in 1976. The end of the production of THINKABOUT was viewed as a beginning of a new instructional experience available to students in Wisconsin in a field scarce of available materials or resources. During the first year of broadcast, 24% of the fifth and sixth grade teachers of Wisconsin used the series.

The main focus of THINKABOUT is thinking skills which underlie the varietal basic skills of language arts, mathematics, and study skills and that transcend the boundaries of these traditional content areas. The series is designed to help students become independent learners and problem solvers who have the confidence and ability to live and produce in a changing world. The goals of THINKABOUT are to encourage the development of and to strengthen in young learners the abilities to effectively express themselves, to manage their own learning, to reason systematically, and to think flexibly. The 60 programs can be used in a variety of ways--as a vehicle for promoting thinking skills in a problem-solving context, as a means of teaching problem-solving techniques, or as a stimulus for reviewing specific language arts, mathematics, or study skills (Sanders and Sonnad, 1981).

Evaluation was a major component of the development process of THINKABOUT. From the beginning, clarification, concept development, and review of nebulous terms as "fundamental learning skills" were obtained from educators and psychologists well respected in their fields. The production staff continually evaluated treatments, scripts, and programs using techniques such as criteria checklists, which provided a quality control of programs and assurances that the production parts met certain expectations (Sloan, 1980, p. 146). As programs became available, a field test was conducted of the Collecting Information cluster, consisting of three programs, to assess the effects of a group of programs (AIT, 1979). The evaluation of THINKABOUT continued through the first year of broadcast with an impact and research study conducted by Sanders and Sonnad (1980).

The impact study, involving 241 classrooms in four consortium states, provides insight into some of the outcomes of THINKABOUT. The programs captured and kept the attention of virtually all students and teachers who viewed them. Classroom discussions of thinking and reasoning skills were stimulated by the programs and accompanying materials. Teachers perceived student improvement in each of the thinking skills areas covered by the series as a result of using THINKABOUT. Classrooms viewing THINKABOUT demonstrated differences on certain communications skills exercises and independent learning exercises from classrooms which had not viewed any of the programs. Students viewing the series provided more options and/or alternatives in the problem setting on certain items. Differences between users and non-users were not observed on standardized achievement test scores.

PURPOSE OF STUDY

THINKABOUT has been used in Wisconsin for two school years. The current information that is available about the use of THINKABOUT is the percentage of fifth and sixth grade teachers who had used the series during its first year, 24%. This was obtained from one of the random sample surveys periodically sent to different groups of Wisconsin teachers to determine the use of instructional television and radio in the state. Very little information is available regarding how THINKABOUT is being used by teachers and what its effects are.

Instructional television programs are designed to be a part of an educational experience that includes provocative questions as an introduction, discussion as immediate follow-up, and instructional activities in following days for reinforcement of the ideas presented. To better effect the use of instructional television and its impact in Wisconsin, the Educational Communications Board is interested in providing support for instructional television to reach its full potential. The main purpose of the study is to provide information that can be used to make decisions about instructional support for THINKABOUT in Wisconsin and for future instructional television series.

THINKABOUT was selected to be the major focus of this study because of two reasons. The high quality of production and the extensive research and evaluation that went into its development should be a motivating factor for teachers to use THINKABOUT as effectively as possible. The support given to the series should be an example of what can be done. Secondly, THINKABOUT presents a number of skills over a large number of programs that should result in many possible ways of supporting the series. How some teachers are supporting THINKABOUT should provide insight into innovative means that can be used in supporting other series.

The main questions to be answered by the study are:

1. What are the effects of THINKABOUT on teachers, students, and instructional programs?
2. What instructional support do teachers need to implement THINKABOUT more effectively?
3. What can be done to expand the use of THINKABOUT in Wisconsin?
4. What implications are there from the implementation of THINKABOUT over two years for the support and production of future instructional television series?

DESIGN

Procedures

A group of teachers who had volunteered to participate in a follow-up study of THINKABOUT completed questionnaires in April and May 1981. This group consisted of teachers who were currently using THINKABOUT, either regularly or occasionally, or who had used THINKABOUT the previous year but were not currently using the series. The latter group was sent a modified version of the questionnaire, including questions about why the teacher was not currently using THINKABOUT. In addition to completing the questionnaire, three groups of teachers currently using THINKABOUT were asked to participate in other parts of the study. Students of one group of six teachers, along with two control classes not using THINKABOUT, were observed and interviewed as the students solved four problems while working in small groups of four. For this part of the study, three groups of students were randomly selected from each class or unit to be interviewed. These interviews were conducted after the last THINKABOUT program was broadcast on May 6. A second group of six teachers was asked to administer a student questionnaire to six of their students selected randomly from their class list. A third group of nine teachers was interviewed by telephone to validate the written information collected by the questionnaire. These groups were selected using a stratified random sample to ensure that both grade 5 and grade 6 were equally represented. Thus, the sources of information for this study were teacher questionnaires from THINKABOUT users, teacher questionnaires from previous users of THINKABOUT, student protocols and responses to four problems, teacher interviews, and student questionnaires.

Sample

In February 1981 a letter of inquiry and a return postcard (Appendix E) were sent to a random sample of 800 grade 5 and grade 6 teachers in Wisconsin. The

letter asked if the teacher was presently using THINKABOUT, if the teacher had used THINKABOUT the previous year, and if the teacher would be interested in participating in a follow-up study of THINKABOUT. No additional mailings were made to those who had not returned the postacard. Only those teachers who returned a postcard and had indicated they would be willing to participate in the study were asked to be in the study. The sample for the study then was a sample of convenience rather than a random sample, and included only teachers who had volunteered to be in the study.

The number of teachers who returned postcards was 256. Six of these teachers were teaching grade 4, four of which had never used THINKABOUT, and were not included in the analysis of the sample. Of the 250 remaining teachers, 121 (48%) taught grade 5, 97 (39%) taught grade 6, and 32 (13%) taught a combination class of grades 5 and 6. This sample is weighted toward grade 5 teachers, however not statistically significant using a chi square test, when compared to the proportion of teachers who responded to a random sample survey regarding social studies administered during school year 1979-80. On that random sample survey, 44% of the grade 5 and grade 6 teachers taught grade 5, 42% taught grade 6, and 12% taught a combination of grades 5 and 6. One possible explanation for the slightly skewed sample is that elementary teachers were more willing to be in the study.

The teachers who completed the THINKABOUT teacher questionnaire were a proportion of the 95 teachers who noted on the postcard that they would be willing to participate in a THINKABOUT follow-up study. Of the 78 teachers from this group who were using THINKABOUT during the 1980-81 school year, 58 of the teachers (74%) returned the questionnaire. Of the remaining 17 teachers, nine had used THINKABOUT the previous year but were not using it during the 1980-81 school year, and eight had never used THINKABOUT. Those who had used THINKABOUT were also sent a

questionnaire regarding their use of the series and their reason for not using it for 1980-81. Seven, or 78%, of these teachers responded to the questionnaire. The sample consisted of those teachers who were interested enough in the study to take the time to complete the survey. The sample then probably contained teachers who were more favorable and interested in THINKABOUT. Therefore, the results of the questionnaire probably reflect the opinion of teachers who have had more positive experiences with THINKABOUT rather than a random sample of those using THINKABOUT.

Six teachers using THINKABOUT and two teachers not using THINKABOUT were selected from the 95 teachers who expressed willingness to participate in the study to have some of their students interviewed while solving problems. The initial design was to have three triads of classes, with one triad consisting of classes at the same grade level, from schools in approximately the same size of community. The three classes in each triad were to have teachers who varied in their length of experience in using THINKABOUT. One class was to have a teacher who had used THINKABOUT two years, one class was to have a teacher who had used THINKABOUT one year only, and one class was to have not used THINKABOUT and was to have a teacher who had never used THINKABOUT. One triad was to be all grade 5 classes, one all grade 6 classes, and one containing combination grade 5/6 classes.

Not all teachers contacted had the time or the interest to participate in the study when they were explained the details. As a result, in order to have classes from the same community who were using THINKABOUT in the proposed grade 5/6 triad, one grade 6 class and one grade 5/6 class were used. A control class was not found in the geographical area of the other classes of this triad to be used in the study. A description of the three triads and the code number given to each class are given in Table 1. Classes 115 and 215 came from the same community but from different schools, as did classes 136 and 235/6. The classes that participated in the student interviews then included those from different grade levels, different sized communities, and had teachers with different amounts of experience using THINKABOUT.

Table 1
Description of Triads and Code Number of Classes
for Student Interviews

	Triad 1	Triad 2	Triad 3
Grade level:	5	6	5/6 & 6
Community size:	4,000-5,000	1,000-3,000	50,000-70,000
Proximity:	50 miles from Milwaukee	15-40 miles from an urban area	
Code number:			
Teacher has used THINKABOUT 2 yrs.	115	126	136
Teacher has used THINKABOUT regularly 1 yr.	215	226	235/6
Teacher has not used THINKABOUT	315	326	Not included

A class list was obtained from each of the eight teachers who were willing to have their students interviewed. In some cases the class list included all of the students at a grade level if students were grouped as a unit for some instruction. Three groups of four students each were selected randomly from the list, along with four alternates. The groups of students interviewed then were not special groups of students and had not worked together as a group prior to the interviews. Because the groups were randomly selected, they should be representative of the classes from which they were selected.

The six teachers who were selected to administer student questionnaires to a sample of their students and the nine teachers who were interviewed over the telephone were selected randomly with the constraint that both grade levels, 5 and 6, were nearly equally represented. Five of the teachers returned student

questionnaires. Four of these teachers had used THINKABOUT regularly for two years, and one was currently using THINKABOUT on occasion for the first time. A total of 29 student questionnaires were returned, 41% from grade 5 students and 55% from grade 6 students. The respondents were nearly evenly divided by sex, 48% were male and 52% were female. Of the nine teachers who were interviewed over the telephone, five had used THINKABOUT regularly for two years, three had used THINKABOUT regularly for the 1980-81 school year for the first time, and one teacher had used THINKABOUT on occasion for two years. Of these teachers, four taught grade 5, three taught grade 6, and two taught a grade 5/6 combination. The sample provided information from both grade 5 and 6 teachers who had a range in experience of using THINKABOUT.

Instruments

The teacher questionnaires are included as Appendix A. Many of the questions and the format came from the questionnaire used in the AIT impact study. The telephone interview questions were designed to parallel questions on the questionnaire. The student questionnaire (Appendix B) is the same as the questionnaire used by AIT.

Twelve problems selected from those used in the AIT impact study, curriculum material on reasoning, and problem-solving material were tried with small groups of students from one class which had viewed most of the THINKABOUT programs. The four problems (Appendix C) selected for the study were the problems that generated the most responses and stimulated the use of a variety of the thinking skills presented in THINKABOUT as students searched for solutions.

Different thinking skills could be used in solving each of the problems. Problem 1 has an impossible solution. The students were to explain why the

solution is impossible. In order to solve the problem, students had to deduce from the conditions of the problem that it is impossible to distribute nine marbles into five cups with a different number in each cup. One possible explanation is that the sum of the five smallest integers--0, 1, 2, 3, 4--is more than 9. In solving this problem, students had to derive meaning from the conditions of the problem--different number in each cup, nine marbles, and five cups. The information of the problem can be analyzed and reshaped by using diagrams or other models of the situation. Information can be judged and a conclusion made that, with the information given, the problem is impossible. Deriving an adequate solution to this problem requires trial and error, persistence, taking a risk, and other processes required for successful problem solving.

Problem 2 requires the comparison of the similarities and differences between two situations and drawing a conclusion. The students were faced with the problem of explaining why the removal of one of four legs on a chair causes it to fall over when other three-legged stools, such as a tripod or an easel, are very sturdy. This is a problem of reasoning by analogy (Harnadek, 1979). Meaning must be derived from the different situations. Different attributes of the two types of structures, three legged stands and four legged stands, must be classified. Diagrams can be used to represent the information and judgments can be made about what information is relevant. Finally, conclusions have to be made by drawing inferences using analogy.

The third and fourth problems are multiple questions which require planning and the generation of information. In the third problem, students were to plan for a radio station for their school. In the fourth problem, students were to identify steps that Jim should consider and perform in making a model spacecraft for a science fair. Both problems require generating and collecting information and

listing alternatives. In some of the questions for each problem, students were asked to order the steps. Since these problems are life-like problems, they require the consideration and specification of criteria such as what do people want to listen to on a school radio station, and what are the rules of the science fair. The radio station problem also requires judging information and identifying important information from less important information. The science fair problem requires summarizing (reshaping information) and planning a presentation (communicating effectively).

Each group of four students was allocated one hour to solve the four problems. Students were instructed before beginning problem 1 to work as a group and to record in the space provided an answer agreed upon by all of the students in the group. The students were asked to verbalize their ideas and to discuss the ideas with each other. THINKABOUT was not mentioned before beginning to solve the problems. The comments and discussion of each group were recorded on audio cassette tapes. Once the students began working on the problems, the interviewer only spoke if the group was silent for a long period of time or if the group reached a complete standstill. The groups were asked general questions about THINKABOUT and related activities after finishing the four problems if time allowed.

Analyses

For the teacher and student questionnaires, frequencies of responses were computed for the multiple choice items and means and standard deviations for the scale items. Results are reported for the individual items. Teacher responses from the telephone interviews were compared with questionnaire responses. Each group of students received a score or scores on each of the four problems. Class scores on each problem were computed by taking the average scores of the three

groups from the class for problems 1 and 2, and the sum of scores for each group on problems 3 and 4. The class scores were used in the analysis.

The investigator scored each item using a predetermined scoring scheme (Appendix C). Problems 1, 2, and 3 were scored on two independent occasions by the researcher to check consistency in scoring. All of the group responses and scores on problems 1 and 2 and a sample of responses and scores on problem 3 are included as Appendix D. Problem 4 was scored by the investigator and one other person independently using the scheme developed by Covington, the developer of the item, which was used in scoring the item for the AIT impact study. Each group on problem 4 was given a score on 27 variables. The percent agreement between the two scorers on the 648 scores for the 24 groups was 88%. The score given to the group where there was disagreement was the consensus reached by the two scorers after discussion.

The total points given on each problem varied. A total of 10 points was given on problem 1, which was the sum of three subscores-- 0-3 points for understanding the problem, 0-4 points for the means used to solve the problem, and 0-3 points for the solution. A maximum of three points was given on problem 2, which represents the inclusion or absence in the response of each of three parts--the accurate description of the propertites of a three-legged stool (1 point), the accurate description of the four-legged chair (1 point), and the accurate conclusion drawing from the differences and similarities of the two situations (1 point).

Problem 3 consisted of two pages. The responses given on page 1 were characterized as tactical--those which are specific features of a radio station such as equipment, building space, and programming; or as strategical--those which are planning steps such as setting up a committee, collecting information (survey), and considering constraints such as time. The sum of tactical responses was the

tactical score and the sum of strategic responses was the strategic score. In addition, each group was given one point for each of four variables--scope and dimension, information, resources and equipment, and sequence of steps--depending upon the presence or absence of items representing the variable. Three questions were asked on page 2. On question 1, the groups were given two scores. One was the number of responses that were forms of information and the other was the number of responses that listed equipment. The number of resources listed was the score given for question 2. Two scores were given for question 3, the number of decision steps listed and a score of 1 or 0, depending on whether items were listed in sequence or not.

Groups were asked to respond to five questions for problem 4. On each question the group was given a score of the number of responses on the variables for that question. On the first question, page 2, the groups were given scores on two variables--deadline/time and people to help. Other variables were not scored because they appear in other questions, such as on page 4. The two questions on page 3 ask for sources of answers to questions. The first question, on the fair deadline, was given scores on school staff, parents/relatives, friends/classmates, fair staff, and media. The variables for the second question, on what a real spacecraft looks like, include the same first three variables as the first question, as well as print materials and other ideas. The scores on these questions represent the awareness of groups to consider different sources of information. On page 4 the groups were given scores for strategic variables--scope/dimension, information/advice, assembling resources, and global statements; and tactical variables--construction, painting, and other ideas. In addition, each group was given one point on an order variable if the responses were listed in some order. The fifth question asked the students what they would do if the deadline for the fair was

sooner than they had planned. Scores were given for seven variables--work harder, give up, stop and salvage, reduce scope, postpone deadline, get help, and other ideas.

Verbatim transcriptions were made of the cassette recordings of the groups. A check was made on the accuracy of the transcriptins by having two people transcribe the same problem for one group. These two transcriptions are included as Appendix F. All transcriptions, protocols, were analyzed for specific examples and evidence of the four general characteristics of independent learners. Evidence of the following characteristics was sought:

Effectively expressing themselves:
- Communicating ideas to others
- Listening to ideas of others
- Group discussion
- Supporting comments
- Group cooperation

Managing their own learning:
- Planning
- Gathering and generating information
- Organizing information
- Asking questions of group
- Redirecting the group
- Making inferences

Reasoning systematically:
- Planning
- Noting details
- Checking
- Using criteria
- Judging information
- Considering alternatives
- Finding patterns

Thinking flexibly:
- Brainstorming
- Considering alternatives
- Using criteria

Information on the four general characteristics was obtained for each class by identifying common evidence of characteristics found in all three groups from a class. If students from each group exhibited the same process, the process was

assumed to be a characteristic of the class. The chracteristics of THINKABOUT classes were contrasted with the non-THINKABOUT classes and differences were noted. Evidence for many processes was not found among the protocols of all three groups from the class. For these processes, groups' differences were considered across all of the THINKABOUT groups and compared with the non-THINKABOUT groups. These processes are less likely to be characteristic of classes but suggest areas where THINKABOUT may have affected some students.

In order to draw any conclusions from this study, findings from a source had to be validated by findings from other sources. The more quantitative information from the questionnaires and answers to the problems were used to support or discredit the more qualitative information obtained from the protocols and vice versa. A reasonable link between THINKABOUT and the results had to be made, as well as the rejection that the results may be due to other causes before conclusions were made. Because of the small sample size and how the sample was selected, the conclusions can only be suggestive rather than definitive about the effects of THINKABOUT. The study is sufficient for the conclusions to provide direction about how to support teachers using THINKABOUT.

RESULTS

Sample Description

Wisconsin teachers representing a range of years of teaching experience are using THINKABOUT. Of the 58 user teachers who returned the survey, the average number of years of full-time teaching was 15, with a standard deviation of 9.5. The range of experience was from one teacher who was in the first year of teaching to one who retired in June 1981 after 41 years of teaching. A large number (95%) of the teachers who responded are experienced teachers with three or more years of full-time teaching.

The sample of teachers who responded to the survey was weighted toward fifth grade teachers, with 55% teaching grade 5, 36% teaching grade 6, and 9% teaching grade 5/6 combination. The type of classrooms of the teachers was nearly evenly split between self-contained classrooms (43%) and unit or team teaching (45%), depending primarily on the grade level taught. Nearly two-thirds of the fifth grade teachers taught in self-contained classrooms, whereas two-thirds of the sixth grade teachers taught in units/teams or by departments. The teachers cannot be classified as having a particular content area of speciality since only a half of the teachers noted having a speciality, with the content areas of social studies and language arts mentioned most frequently. Three teachers reported math as a specialty, two reported science, and one reported affective learning.

The sizes of the schools of the teachers responding varied from one school having only one teacher for fifth and sixth grade, to one school having 12 teachers. The mean number of fifth and sixth grade teachers was four. At most schools, nearly 70%, THINKABOUT was not used by all of the grade 5 and 6 teachers. At 24% of the schools, only one teacher used THINKABOUT; at 35% of the schools, two

teachers used it; and at 24% of the schools, three teachers used it. At a few schools THINKABOUT was either used by all of the grade 6 teachers or all of the grade 5 teachers. The range of the number of students with whom teachers used THINKABOUT was from 18 to 250 students, with a mean of 55, reflecting that over 50% of the teachers taught as part of a team/unit or department. Most teachers (90%) used THINKABOUT with all of their students, with only 10% of the teachers using the series with a particular class such as homeroom, English, or guidance.

THINKABOUT did not generate a new audience for ITV, nor did many teachers receive training in the use of THINKABOUT. Other ITV series had been used by nearly all of the teachers (88%). Only a few (12%) of the teachers had received any type of an in-service on THINKABOUT--3% had received a school workshop, 3% a district workshop, and 6% a regional workshop.

The six teachers who were using THINKABOUT and whose students were interviewed differed some from the sample of teachers responding to the survey. The interviewed classes were weighted more toward grade six, including two fifth grade classes, three sixth grade classes, and one combination 5/6 grade class. The teachers, on the average, were more experienced, averaging 19.5 years of experience. The classroom setting had nearly the same split as the large sample, with half of the classes being self-contained and the other half organized as units or departments. Two-thirds of the teachers in the smaller sample had a content speciality, a slightly higher proportion than the larger sample. All of the teachers in the smaller sample used the series with all of their students, which averaged nearly 41 students per teacher, which was lower than the average for the larger sample. Although the statistics of the smaller sample were not exactly the same as the larger sample, the differences were small enough that it was assumed that the six classrooms were fairly representative of the larger group.

An indication of the achievement of students in each class was obtained from available standardized achievement test scores for seven of the eight classes from which students were interviewed. Two of the fifth grade classes only had available scores from tests administered while the students were in third grade, two classes had scores available from the year before, and three classes had scores from tests just administered. The Stanford Achievement Test was used by four of the classes, the Otis-Lennon Mental Ability Test by two of the classes, and the Metropolitan Achievement Test by one class. The range in grade equivalent or percentile scores and the mediums for each class were contrasted to provide some evidence of the achievement levels of the classes. The medium scores for each class were at grade level or above for the age level when each class took the test. Two of the classes, 215 and 226, had higher medium scores relative to the expected grade equivalent scores than did the other clases. The medium of four of the classes--126, 136, 315, and 326--were closer to the expected grade equivalent scores. The medium grade equivalent of one class, 115, was the same as the expected grade equivalent score. The teacher of the remaining class, 235/6, reported that most of the students in the class were reading and doing math at grade level. Thus the achievement levels of the classes that participated in the study were at grade level or slightly above. The level of achievement of the non-THINKABOUT classes was slightly above the expected grade level, as were most of the THINKABOUT classes. Achievement was not a factor that separated the THINKABOUT classes from the non-THINKABOUT classes.

Validation of Teacher Questionnaire

Information from the telephone interviews of nine of the teachers asked to complete the questionnaire generally supported the results from the questionnaire. Two comparisons were made, one between a teacher's response on the questionnaire

and his/her response in the interview, and the second between the aggregated responses on the questionnaire and all of the responses for the interview. There was high agreement between the interviews and questionnaire responses on why teachers used THINKABOUT, effective ways of using THINKABOUT, student outcomes, information about other teachers from the school using THINKABOUT, and ways of using THINKABOUT more effectively. There was some disagreement in reporting the total amount of time spent on THINKABOUT-related activities and in reporting how THINKABOUT is used in relation to content areas. The times reported on the questionnaires were greater than given during the interviews, particularly for pre-viewing activities. Also, even though some teachers reported on the questionnaire that they used THINKABOUT as a subject matter in itself, they reported in the interview that the series was used to supplement content areas such as social studies and language arts. Most teachers thought even though THINKABOUT was not used as a part of one content area, the series was related to or interjected with one or two content areas.

Teacher Use of THINKABOUT

During the 1979-80 school year, 24% of the grade 5 and grade 6 teachers in Wisconsin used THINKABOUT. An estimate of 26% of the grade 5 and grade 6 teachers is projected to have used THINKABOUT during the 1980-81 school year. This figure was computed using the 1979-80 figure and the number of teachers returning the postcard who had used THINKABOUT both years.

The most frequent reason given on the teacher questionnaire for using THINKABOUT was the emphasis the series places on reasoning, thinking, problem solving, and decision making. Another frequent reason was because the series shows

students how to deal with life situations. Examples of teacher responses when asked the main reason for using THINKABOUT are:

- (THINKABOUT) helps students reason and think about problems that occur in everyday life and what can be done about them.
- It leads children into really thinking about many situations they could run into and some ways of handling them.
- It challenges the children in real situations that they face. It makes them think and not just absorb.

Other reasons mentioned by four or more teachers were because students enjoy the programs and because the series stimulates discussion. Overall, teachers valued the skills that are included in the series and appreciated having them presented in an everyday life context that students enjoy viewing.

The decision to use THINKABOUT was primarily that of teachers. Seventy-two percent of the teachers reported themselves as being the most influential in deciding to use THINKABOUT, as well as 19% of the teachers saying that some other teacher had influence. The ITV representative was influential in only 7% of the cases. Each of the other sources, such as administrators or media specialist, influenced no more than 5% of the teachers.

One problem for some teachers in the use of THINKABOUT is that it is designated to be used with two grade levels. Of the seven teachers who had used THINKABOUT the previous year and were not using it in 1980-81, the main reason for not using it was because the students had already seen the series. Most of these teachers were teaching grade 6 or 5/6 as part of a unit. One school has a plan to show THINKABOUT to both fifth and sixth graders every two years. All of the teachers who said some of their students had viewed THINKABOUT said they were planning to use the series next year. Only one teacher reported problems with getting equipment, poor reception, and time conflict. Using THINKABOUT every other year is how some teachers have dealt with having THINKABOUT available for both fifth and sixth grade students.

On the average, teachers spent 48 minutes a week viewing THINKABOUT and doing related activities. This time may be slightly inflated based on the telephone interviews. Most of the teachers (66%) viewed two programs a week. Nearly half of the teachers spent from 5-10 minutes a week previewing the programs, whereas one-third did not do any previewing activities. The average amount of time spent on discussion immediately following the programs was 12 minutes a week. Discussion was the main follow-up activity and was engaged in by nearly all of the classes (88%). This corresponds to the view of some teachers that programs from the series were very good in generating discussions. Two-thirds of the teachers did not do any other in-class assignments directly related to THINKABOUT besides discussion. The third of the teachers who did do related activities spent from 5-30 minutes a week on the activities. Thus, for one program, teachers generally spent 3 or 4 minutes introducing it, 6-10 minutes discussing it afterwards, and very little time doing any related activities.

The activities that teachers did use varied and were generally related to those given in the guide. Seven of the teachers said they do some form of discussion when a situation arises in class that is related to something from THINKABOUT, or in helping the students organize their thoughts. Six of the teaches said they have their students do writing such as follow-up stories, reports, or papers. Other activities or materials mentioned by two teachers were posters, time capsule, Weekly Readers, role playing, follow-up projects, and brainstorming. Activities mentioned by one teacher were stories, presentations, investigations, creative writing, signing (sign language), patterns, advertisements, charades, mobiles, blockbusting, surveys, games, paper airplane contest, and slide series.

About half of the teachers had used all of the programs in the series. The average number of programs used by the teachers was 47. Time and scheduling

problems were most frequently given as reasons for not viewing all of the programs. Only two teachers reported viewing programs one day a week. One teacher thought they were only broadcast one day a week and the other could only schedule them on Wednesday. One teacher who only used part of the programs said that the district had divided the programs according to content and difficulty. The others who had not used all of the programs mainly experienced time or scheduling conflicts because of vacation or other activities.

The main material used along with THINKABOUT was the teacher's guide, used by 70% of the teachers. The guide was rated excellent by 21% of the teachers and only negatively by 3% of the teachers. Suggestions teachers gave for making the guide more useful were to include run-on pages, some reproducible discussion topics, space after each program's material for jotting down notes, numbering programs, and having pre-planned or ready-to-use follow-up activities. Only one teacher was critical and felt many of the activities were quite time-consuming and had difficulty finding time for the activities. Only three teachers reported materials that they had prepared which included diagrams; booklets for goal setting, posters, and worksheets; and situations from the students' day.

Teachers did not express a great need for the supplementary material that was listed--workbooks, duplicating masters, learning games, and teaching posters. Over 50% of the teachers reported that these materials would be only useful or not necessary. Less than 10% of the teachers reported that any of these materials were essential. Most teachers interviewed felt they would not use supplementary materials because of the problem of finding time to use them or the cost to purchase them.

Teacher Perception of THINKABOUT

The overall rating of THINKABOUT by teachers was very positive, with over two-thirds of the teachers rating the series as excellent, the highest category on a five-point scale. Only 3% of the teachers had mixed feelings about the program (a rating of 3), and none of the teachers rated the series below this level. Teachers reported that their students reacted to THINKABOUT nearly as positively as they did, with 93% of the teachers reporting a positive reaction from their students.

THINKABOUT had an impact on classroom interactions. Sixty percent of the teachers agreed or strongly agreed that the programs aroused discussion in their classes. A slightly higher percentage reported that most of their students participated in the discussions. Over two-thirds of the teachers brought up ideas from THINKABOUT programs in teaching content areas. As most teachers reported in the telephone interviews, THINKABOUT was used in relation to or interjected with content areas such as language arts and social studies. Students were less likely to bring up ideas from the programs, but still nearly 50% of the teachers reported their students doing this.

Teachers perceived that THINKABOUT helped, at least somewhat, to improve students' skills on the 13 main thinking skills presented by the series. The series was most helpful in improving students' skills in solving problems. For this skill, a third of the teachers reported the series was extremely helpful and 56% reported at least somewhat helpful. Other skills for which THINKABOUT was felt by 83% of the teachers to be helpful in improving were judging information, communicating effectively, using criteria, and collecting information. The skill that nearly one-third of the teachers felt THINKABOUT was not helpful in improving was estimatng and approximating. No more than 10% of the teachers, however, said for any one of the skills that THINKABOUT was not at all helpful.

Teachers were less positive in rating the success of THINKABOUT in meeting its goals than they were in assessing the degree to which the series was helpful in improving thinking skills. Generally, less than half of the teachers rated high or very high the level of THINKABOUT's success in strengthening the ability of students to be problem solvers and independent learners, or the four characteristics of these abilities--effectively expressing themselves, managing their own learning, reasoning systematically, and thinking flexibly. From 30%-52% rated THINKABOUT's success as high, 28%-46% as neutral, and 5%-12% as low. Strengthening students' ability to be problem solvers was rated higher than strengthening their ability to be independent learners, 52% positive responses compared to 43%. The success of THINKABOUT to strengthen the abilities of thinking flexibly and reasoning systematically, both rated positively by 46% of the teachers, were rated the highest among the four characteristics, followed by effectively expressing themselves (43% positive responses), and managing their own learning (31% positive responses). Effectively expressing themselves had the highest average rating (3.5 on a 5 point scale) of the four abilities.

The positive feelings teachers had toward THINKABOUT strengthening problem-solving skills may be partially related to the popularity of programs. The three programs liked the best by the most teachers are from the Problem Solving Cluster--programs 57 ("A Matter of Time"), 58 ("There's Always a Risk"), and 59 ("Hanging in There"). These programs are a three-part serial and were among the most recent programs viewed prior to teachers completing the questionnaire, which may account for some of their popularity. Other programs that were rated by three or four teachers to be among the best program were programs 56 ("One Thing Leads to Another"), 2 ("Brainstorming"), and 17 ("Where Should I Go?"). The one program rated among the worst by the largest number of teachers, eight, was program 60

("Plan a City of the Future"). Other programs which were the least favorite of two or three teachers were program 30 ("Checking Conclusions"), program 23 ("There are Many Ways to Go"), and program 55 ("Making Something New"). Three of the four mentioned most frequently as the worst are tip and challenge programs.

Teachers agreed very little on the best and worst programs other than those mentioned above. Thirty-six of the 60 programs were rated among the best, while 27 programs were rated among the worst by at least one teacher. A large number of programs appeal to teachers in different ways. The variability in appeal suggests the programs in the series have some diversity.

Many of the teachers, 32 of the 58 teachers who completed the questionnaire, reported some of their positive experiences with THINKABOUT. The most common experiences were with good class discussions, high interest level of students, and what students learned from the programs. Some of the comments of teachers were:

- Several times skills presented related directly to skills needed that very day or week in some social studies work. It made for very effective application. Exciting!
- Holds student interest--plots
- Good discussion
- Carry-over value into other subject matter; student eagerness to view program
- They have motivated good discussions.
- Group felt the "Communicating Effectively" series was very good, seemed to have good results with students also.
- The kids picked up problem solving on their own.

Other experiences that were given, but not as frequently as the three types above, were good examples or presentation of concepts, helpful with teaching, and relevant to students. Some of the teachers' comments were:

- Students can relate to situations and characters of the program. They look forward to seeing it.

- It really illustrates concepts in an exciting manner to students.
- They always seem to relate programs to their own experience.

Only ten teachers (17%) identified some negative experiences with the series. Three of the teachers felt some frustration because of not having enough time to do the follow-up activities and to use the series as effectively as it could be. "Not enough time in daily schedule to provide ample opportunities to apply skills. Pupils should have time to see skills that work for them in settings similar to what programs showed." Two teachers expressed a lack of student interest in some of the programs. Two other teachers expressed some stigma against watching television. "None, except that I have trouble convincing our administration that this program and other TV programs have value." One teacher felt that the program on risks left the students hanging. Finally, one teacher was less enthusiastic with the program during the second year. "The second year I used THINKABOUT it was less effective--mostly because it was not (the) first time with me as the teacher, so...less enthusiasm, less association, less effective use of content. Next year I plan on using some other program, just for variety. I will be teaching the skills approached by THINKABOUT, but in a different way."

Over half of the teachers took the time to write down some of their own comments. All of these comments were very positive except for one teacher who felt the questionnaire was too long. A random sample of five of the comments are given below.

- The examples were of daily experience that a child might experience.
- Good program for teaching kids to organize thoughts and days.
- I feel your program has been a good motivator in class discussions. My students have been able to identify with the actors and actresses on your program.

- I wish there were about six more programs so that THINKABOUT would continue until June.

- I really hope the program will continue.

Teacher In-service

Not a large number of teachers were interested in a THINKABOUT in-service or gathering of teachers. Only 29% of the teachers said they would be interested in meeting with other teachers who use THINKABOUT from their area, and 38% said they would like to have an in-service on THINKABOUT. Of the comments written by the teachers about what could be done to help them more effectively implement THINKABOUT, provide more time was given the most frequently, six of the 24 comments. Three of the teachers asked for an in-service and two suggested activities for each program. Other suggestions included having more information on the programs, having more student materials, and having duplicating masters. One teacher would like to have new programs each year, or at least to have two sets that could be shown on alternate years. Of the eight responses to what would be a good time to have an in-service, most mentioned a time directly following school or on in-service days.

Student Perceptions

Problem solving, as for the teachers, was perceived by the students as the area where THINKABOUT had been the most help. However, on the questionnaire completed by 29 students, students distinguished between THINKABOUT helping them with the process of solving problems and solving problems on their own. Over three-quarters of the students agreed or strongly agreed that THINKABOUT helps them to see more than one way to solve a problem, come up with new

ideas, and learn better ways to solve problems. Whereas when asked if THINKABOUT has shown them how to solve problems on their own, less than half of the students agreed. Most students also did not agree that THINKABOUT helped them to say better what they wanted to say.

Most students liked THINKABOUT very much. Less than one-quarter of the students were either indecisive or negative towards the series. The most popular programs of the students were programs 58 ("There's Always a Risk"), 57 ("A Matter of Time"), 56 ("One Thing Leads to Another"), and 2 ("Brainstorming"). These are many of those liked the best by teachers. The least popular programs of the students were programs 36 ("Where Do You Find Them?"), 5 ("Estimating"), 60 ("Plan a City of the Future") 33 ("Plan Ahead"), and 51 ("Planning a Presentation"). As with the teachers, a large number of programs were selected at least by a few students as either the ones most liked or the one least liked.

Group Response Analyses on Four Problems

The responses to the four interview problems were analyzed to identify differences between THINKABOUT students (users) and non-THINKABOUT students(non-users) on three of the four qualities of problem solvers and independent learners--reasoning systematically, management of own learning, and flexible thinking. Evidence of the fourth quality, effective expression, was sought in the analysis of the group protocols rather than in the responses. The scores of the responses on the four problems for each class, users and non-users, are given in Tables 4 through 17. Tables 2 and 3 show the average time spent by the groups from each class solving the problems.

The amount of time spent by the groups solving the problems indicates that students were interested in the problems and that the problems were not trivial for them (Tables 2 and 3). However, none of the groups spent all of the 60 minutes that was allocated to work on the problems. The time spent ranged from 4-6 minutes on problem 1, from 4-8 minutes on problem 2, from 18-23 minutes on problem 3, and from 11-15 minutes on problem 4.

Most of the groups of students, users and non-users, had difficulty making inferences and drawing conclusions, both facets of reasoning systematically. On problem 1 (Tables 4 and 5) students generally understood the conditions of the problem and tried some means of solving the problem, such as drawing a figure and trial and error. The students did have more difficulty in drawing an appropriate conclusion or giving an appropriate reason. On problem 2, students had difficulty analyzing the similarities and differences between two situations and then making a conclusion. All classes scored low on problem 2. The scores were not consistent enough between users and non-users on problem 1 and 2 to say that there were any differences between the two groups in their means of solving the problems and in their ability to make inferences.

Table 2
Average Minutes Spent on Problems by Class
Grade 5

Problem	THINKABOUT Classes 115	215	Grade Mean	Non-THINKABOUT Class 315
1	4	5	4.5	6
2	7	4	5.5	8
3	19	20	19.5	22
4	13	15	14.0	14
Total	43	44	43.5	50

Table 3
Average Minutes Spent on Problems by Class
Grade 6

Problem	THINKABOUT Classes 126	136	226	235/6	Grade Mean	Non-THINKABOUT Class 326
1	7	6	6	6	6.25	5
2	11	4	5	5	6.25	4
3	21	21	18	23	20.75	16
4	11	8	14	15	12.00	12
Total	50	39	43	49	45.25	37

Table 4
Mean Class Scores on Problems 1 and 2 for Grade 5

Problem	THINKABOUT Classes 115	215	Grade Mean	Non-THINKABOUT Class 315
Problem 1 (10 possible)	5.67	9.33	7.50	8.33
Problem 2 (3 possible)	1.00	.67	.83	.33

Table 5
Mean Class Scores on Problems 1 and 2 for Grade 6

Problem	THINKABOUT Classes 126	136	226	235/6	Grade Mean	Non-THINKABOUT Class 326
Problem 1 (10 possible)	7.67	8.67	7.33	7.67	7.83	5.33
Problem 2 (3 possible)	1.00	.67	0.00	.33	.50	1.00

Slight differences were noted between user and non-user classes on facets of managing their own learning. On problem 3, some sixth grade users sequenced their responses in planning for a school radio station, whereas none of the groups of sixth grade non-users did (Tables 6, 7, 8, and 9). On problem 4, page 4, the user groups gave as many or more strategic responses than did the non-user group (Tables 14 and 15). Strategic responses reflect the overall planning, systematic appproach, and organization of a task into manageable parts. This is contrasted with the second type of responses, tactical, which are concerned with specific details of a project.

Table 6
Class Scores on Variables for Problem 3, Page 1
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Class
	115	215	Grade Mean	315
Tactical	22	8	15.0	13
Strategic	6	4	5.0	8
Scope & dimension (3 possible)	1	2	1.5	2
Information (3 possible)	1	0	.5	1
Resources & equipment (3 possible)	3	3	3.0	2
Sequence of steps (3 possible)	1	0	.5	0

Table 7
Class Scores on Variables for Problem 3, Page 1
Grade 6

Variable	THINKABOUT Classes					Non-THINKABOUT Class
	126	136	226	235/6	Grade Mean	326
Tactical	4	4	12	6	6.50	5
Strategic	9	3	9	6	6.75	3
Scope & dimension (3 possible)	3	2	3	3	3.75	1
Information (3 possible)	2	1	3	2	2.00	2
Resources & equipment (3 possible)	0	0	2	0	.50	1
Sequence of steps (3 possible)	1	0	1	1	.75	0

Table 8
Class Scores on Variables for Problem 3, Page 2
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Classes
	115	215	Grade Mean	315
Q1 Information (15 possible)	2	5	3.5	4
Q1 Equipment (15 possible)	13	10	11.5	11
Q2 Resources (15 possible)	8	8	8.0	5
Q3 Decision steps (15 possible)	0	0	0.0	5
Q3 Sequence	0	0	0.0	1

Table 9
Class Scores on Variables for Problem 3, Page 2
Grade 6

Variable	THINKABOUT Classes					Non-THINKABOUT
	126	136	226	235/6	Grade Mean	326
Q1 Information (15 possible)	4	4	7	7	5.50	7
Q1 Equipment (15 possible)	1	9	8	3	5.25	7
Q2 Resources (15 possible)	5	9	14	10	9.50	10
Q3 Decision steps (15 possible)	7	7	2	9	6.25	7
Q3 Sequence	1	1	1	2	1.25	0

The differences between user and non-user groups on these variables were particularly noticeable for the grade 5 groups (Table 14), where the user group gave many more strategical responses. Another indication suggesting that the students from user classes might be better able to manage their own learning was the number of responses of working harder on problem 4, page 5. Students were confronted with Jim's problem of suddenly finding out that the science fair deadline was sooner than he was told, and they were to generate ideas of what Jim could do. At least one or more groups from each user class gave a response about working harder (Tables 16 and 17). Only one group from all of the six non-user groups, two classes, gave such a response. The most frequent response of the non-user classes was to reduce the scope of the project in some way.

Although there was some evidence that the THINKABOUT classes gave more strategic responses than the non-THINKABOUT classes, the evidence was not without some questions. On problem 3, the fifth grade non-user class gave more strategic responses than did either of the user fifth grade classes (Table 6), and more than two of the user sixth grade classes. Problem 3 is more open ended and depicts a situation that is not as realistic as problem 4. More creativity is required for problem 3. One possible explanation is that THINKABOUT groups may be better able to plan and be systematic in a more structured and realistic situation than in a more open-ended situation.

The THINKABOUT classes showed more flexible thinking on problem 4, page 3, than did the non-THINKABOUT classes. On this page groups were asked to list sources of information for finding out when the fair deadline is and where to get information on spacecrafts. THINKABOUT groups at both grade levels gave more other ideas such as asking a scientist or writing to NASA to get information about spacecrafts than did the non-THINKABOUT groups (Tables 12 and 13). On this question THINKABOUT

groups gave more of a variety of responses. Contrasting this with the creativity shown by the fifth grade non-THINKABOUT class on problem 3, the THINKABOUT classes showed more of a breadth in responding to problem 4, page 3, whereas the fifth grade non-THINKABOUT class on problem 3 showed more depth.

The group responses on the four problems point to some possible differences between the THINKABOUT classes and the non-THINKABOUT classes. The differences suggest that the THINKABOUT students may be more adept in managing their own learning because of evidence of sequencing steps, listing strategic responses to a realistic situation, and working harder when faced with a time constraint. THINKABOUT classes also showed a little more flexible thinking in identifying a variety of sources of information. The differences were not always clear-cut, particularly since in a more open-ended situation groups from one non-THINKABOUT class listed more planning, strategic responses than did most of the THINKABOUT groups. All groups from both types of classes had difficulty making inferences.

Table 10
Class Scores on Variables for Problem 4, Page 2
Time Deadline and People to Help
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Classes
	115	215	Grade Mean	315
Deadline, time	2	1	1.5	1
People to help	0	2	1.0	1

Table 11
Class Scores on Variables for Problem 4, Page 2
Time Deadline and People to Help
Grade 6

Variable	THINKABOUT Classes					Non-THINKABOUT Classes
	126	136	226	235/6	Grade Mean	326
Deadline, time	0	1	2	1	1.00	1
People to help	1	0	2	0	.75	2

Table 12
Class Scores on Variables for Problem 4, Page 3
Information Fair Deadline and Information on Spacecrafts
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Classes
	115	215	Grade Mean	315
Fair Deadline				
School staff	2	2	2.0	2
Parents, relatives	0	0	0.0	0
Friends, classmates	0	2	1.0	3
Fair staff	2	2	2.0	0
Media	3	1	2.0	2
Spacecraft Information				
School staff	0	0	0.0	0
Parents, relatives	0	0	0.0	0
Friends, classmates	0	0	0.0	0
Printed material	3	3	3.0	4
Other ideas	3	4	3.5	2

Table 13
Class Scores on Variables for Problem 4, Page 3
Information on Fair Deadline and Information Spacecrafts
Grade 6

Variable	ThinkAbout					Non-THINKABOUT Class
	126	136	226	235/6	Grade Mean	326
Fair Deadline						
School staff	0	1	2	4	1.75	0
Parents, relatives	0	0	0	0	0.00	0
Friends, classmates	0	0	1	1	.50	2
Fair staff	3	1	0	0	2.00	3
Media	2	0	2	1	1.25	1
Spacecraft Information						
School staff	0	0	0	1	.25	0
Parents, relatives	0	0	0	1	.25	0
Friends, classmates	0	0	0	0	0.00	0
Printed material	3	3	4	6	4.00	4
Other ideas	3	4	1	2	2.50	0

Table 14
Class Scores on Variables for Problem 4, Page 4
Steps in Jim's Plan
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Class
	115	215	Grade Mean	315
Strategic Variables				
Scope, dimension	2	3	2.5	2
Information, advice	1	0	.5	0
Assemble resources	4	4	4.0	1
Global statements	2	3	2.5	1
Subtotal	9	10	9.5	4
Tactical Variables				
Construction	1	1	1.0	6
Painting	4	3	3.5	3
Other ideas	2	3	2.5	0
Subtotal	7	7	7.0	11
Order				
Order	3	3	3.0	3

Table 15
Class Scores on Variables for Problem 4, Page 4
Steps in Jim's Plan
Grade 6

Variable	THINKABOUT Classes					Non-THINKABOUT Class
	126	136	226	235/6	Grade Mean	326
Strategic Variables						
Scope, dimension	4	3	3	4	3.50	3
Information, advice	0	1	0	0	.25	0
Assemble resources	3	2	4	3	3.00	2
Global statements	2	3	1	1	1.75	3
Subtotal	9	9	8	8	8.50	8
Tactical Variables						
Construction	2	4	2	6	3.50	2
Painting	2	2	2	3	2.25	2
Other ideas	1	2	2	1	1.50	2
Subtotal	5	8	6	10	7.25	6
Order						
Order	3	3	3	3	3.00	3

Table 16
Class Scores on Variables for Problem 4, Page 5
Meet Approaching Deadline
Grade 5

Variable	THINKABOUT Classes			Non-THINKABOUT Class
	115	215	Grade Mean	315
Work harder	3	2	2.5	1
Give up	1	0	.5	0
Stop & salvage	0	0	0.0	0
Reduce scope	3	2	2.5	7
Postpone deadline	0	0	0.0	0
Get help	2	2	2.0	2
Other ideas	0	0	0.0	0
Total	9	6	7.5	10

Table 17
Class Scores on Variables for Problem 4, Page 5
Meet Approaching Deadline
Grade 6

Variable	THINKABOUT Classes					Non-THINKABOUT Class
	126	136	226	235/6	Grade Mean	326
Work harder	1	2	3	1	1.75	0
Give up	0	0	0	0	0.00	0
Stop & salvage	0	0	0	0	0.00	0
Reduce scope	0	7	1	9	4.25	7
Postpone deadline	0	0	0	0	0.00	0
Get help	1	3	2	1	1.75	1
Other ideas	0	1	1	0	.50	0
Total	2	13	7	11	8.25	8

Protocol Analysis

Transcripts made of the groups' discussions as they worked on the four problems were analyzed by identifying processes and procedures used by each group that would fit under any of the four general characteristics of an independent learner--group interaction, management of own learning, reasoning systematically, and flexible thinking. Each transcript was read and examples of the processes noted. Then the processes found to be used by all of the three groups from one class were labeled as common processes for the class. These were assumed to be characteristics of the class and to be partially the result of a common experience, such as viewing THINKABOUT.

The most apparent difference was that the groups from the THINKABOUT classes more freely expressed their ideas to the groups and engaged in a dialogue than did the groups from the non-THINKABOUT classes. In the THINKABOUT groups, students would occasionally ask questions of the group, discuss the ideas given by another member of the group (particularly sixth graders), and occasionally offer some form of evaluation of the ideas. This happened very infrequently in the non-THINKABOUT groups where there was little discussion and the work was either done as individuals or by only two or three group members.

To illustrate the differences in the type of discussions that occurred in many THINKABOUT groups and in nearly all non-THINKABOUT groups, parts of the protocols of all of the non-THINKABOUT groups and one randomly selected THINKABOUT group from each grade level are given as Figures 1-4. The question--problem 4, page 3, question 2--asks the group to give ideas about how Jim might find out more about actual spacecraft so his model will look real. The responses of the non-THINKABOUT groups, Figures 1 and 2, are short, lack variety, and were generated generally by only one or two of the students. The protocols of the two THINKABOUT groups, Figures 3 and 4, are much longer in length than any of the non-THINKABOUT protocols, and show interactions between the group members that was not apparent in the non-THINKABOUT groups.

315 G1 "Go get a book."
"Science book or else encyclopedia."

315 G2 "Books, designs"
"Look in books."
"U.S.A."
"Designs"
"Oh, you mean the designs on the outside of the rocket spacecraft."
"Yeah."
"Pictures"
"Looking at the outside of a rocket. They have to know what they should put down."

315 G3 "Look in the encyclopedia or get a book."
"Yeah, book or encyclopedia."
"...or even look at a model that he has or one of his friends has."

Figure 1. Protocols of grade 5 students from non-THINKABOUT class 315 responding to problem 4, page 3, question 2. G1, 2, and 3 designates group.

326 G1 "Look up in encyclopedia."
Pause as one person writes the answer.
Another student reads what was written and then group goes on.

326 G2 "Gets some books, space books."
Pause
"How to spell?"
"How to spell?"
"Close enough"

326 G3 "Look up rockets in encyclopedia." (student 1)
"That's all I can think of." (student 2)
"Or else you can go to a museum." (student 1)
"What if it's a few hundred miles away?" (student 2)
"Yeah, that's enough." (student 1)

Figure 2. Protocols of grade 6 students from non-THINKABOUT class 326 responding to problem 4, page 3, question 2. G1, 2, and 3 designates group.

115 G3 "Hm...ask."
"In a science book."
"No, read a lot of books."
"Yeah."
"We can have several answers...read books."
"Wait...wait...hm."
"Don't put it down."
"No, wait."
"The books"
"...do research."
"That's books, ok...ask people."
"Go to actual site, you know, I mean of the rocket."
"Ask Sharon."
"Oh yes. Where would we go around here?"
"I want to say something. I want to go to New York and see..."
"Yeah."
"Hey"
"If someone has a rocketship, ask them."
"Ask an astronaut. I didn't say to ask people or anything."
"What else?"
"That's all."
"Oh."

Figure 3. Protocol of one group of grade 5 students from THINKABOUT class 115 responding to problem 4, page 3, question 2. G3 designates group.

226 G1 "Where would we find out information to make it look real... the encyclopedia."
"Encyclopedia."
"They have lots of spaceships."
"Go to..."
"How do you spell it?"
"E-n-c-y-c-l-o-p-e-d-i-a"
"He could go to a hobby shop."
"They launch one every month."
"If you look in science fiction books they have a lot..."
"Yeah"
"...pictures."
"Reference books."
"Well, science fiction they have lots of spaceships and things...George, don't worry about it."
"Spaceship book."
"Well, that's science fiction."
"He can look in the book Cosmos! Cosmos."
"Well, that's probably..."
"That's a science fiction book."
"Well, that's probably enough."
"That shows spaceships that shows three or four."

Figure 4. Protocol of one group of grade 6 students from THINKABOUT class 226 responding to problem 4, page 3, question 2. G1 designates group.

Many thinking skills and processes are associated with the management of one's own learning. For indication of this quality of independent learners, evidence was sought of planning, gathering and generating information, transforming information into another form, questioning, synthesizing information, drawing conclusions, evaluating information, perseverance, and redirection to the task at hand. All of the thirteen thinking skills presented in THINKABOUT are related in one way or the other with management of learning.

Few differences were observed in the protocols that would support the fact that the THINKABOUT classes could manage their own learning better than the non-THINKABOUT classes. Many of the characteristics were rarely observed in any groups such as checking, redirecting the group, perseverance, listing alternatives, varying conditions to a problem, and restating a problem using their own words. Other characteristics were observed as frequently in non-THINKABOUT groups as in THINKABOUT groups such as considering a plan, seeking information from people using surveys or polls, considering an analogous situation, making inferences, and reshaping information by using diagrams.

The one difference that could characterize more of the THINKABOUT groups than the non-THINKABOUT groups was the clarification of ideas or building upon the idea given by another member of the group. Only one of the six non-THINKABOUT groups was observed doing this, whereas nearly a half of the THINKABOUT groups were observed clarifying, noting errors, or commenting on the ideas of others. Frequently, the comment would be prefaced with "Yeah, but..." In contrast, the non-THINKABOUT groups usually accepted ideas as they were given without discussion or advancement. Figures 5, 6, and 7 provide examples of groups building upon ideas of one member. Figures 5 and 6 are protocols of THINKABOUT groups. Figure 7 gives a protocol from a non-THINK-ABOUT group that illustrates one of the rare times that one of these groups built upon ideas of others in the group. Building upon ideas of others in the group was observed only on an occasion in any group, but almost never in the non-THINKABOUT groups.

215 G1 Deciding on what should be broadcast:
"...educational stuff."
"You're learning something."
"You could listen to educational stuff and music."
"But you are already at school learning educational stuff."
"What's the use of learning it on the radio?"
pause
"You probably..."
"Something that's going on around the school."
"Yes, you want to have someone talking about what's going on...and say like...this week we have the basketball team..."
"Yeah, you could tell the sports."

Figure 5. Protocol of one fifth grade THINKABOUT group, 215 G1, for problem 3, page 1, showing one member building on the ideas of another member.

126 G1 Deciding how to plan for a radio station:
"How about news?"
"Think about what they do on a radio."
"Can't do this. Have to have what people like."
"Have to plan out what is education, like what they have on TRADE-OFFS."
"They have to decide what programs are to be aired. So let's just think of some."
"Education, news, or weather...what else can we do?"
"You are not answering the question. It says what you would do to plan."
"To plan go around to ask people questions. That's how you would get started."
"How would you go about doing it?"
"Oh, I get it."
"How about taking a survey?"

Figure 6. Protocol of one sixth grade THINKABOUT group, 126 G1, for problem 3, page 1, showing how one student notes misdirection of group.

326 G1 Things to know in order to set up a plan:
"He would need someone else because probably doesn't have enough time to build it himself."
"Have to ask someone."
"Like his daddy."
"I doubt if his mom will help."
"Maybe he wouldn't have a dad?"
"Get someone else."

Figure 7. Protocol of one sixth grade non-THINKABOUT group, 326 G1, for problem 4, page 2, showing how one student builds upon ideas of another.

The characteristics for systematic reasoning that were sought in the protocols were planning, using criteria, noticing details, judging information, making inferences, considering alternatives, searching for patterns, noting the conditions of the problem, and evaluating responses. As with managing their own learning, these characteristics are included in the set of the thirteen thinking skills of the series.

Very few differences in systematic reasoning were observed in the protocols of the THINKABOUT and non-THINKABOUT classes. Groups from both types of classes considered forms of planning, considered criteria, and noted conditions of the problems. Some of the criteria that were suggested to be used were teachers' opinions, time restraints, and student opinions. Groups from both THINKABOUT and non-THINKABOUT classes misinterpreted problems and had difficulty reaching a conclusion. Almost none of the groups looked for alternatives or evaluated information.

No differences were found between THINKABOUT and non-THINKABOUT classes in beginning work on problems with general ideas rather than with specific details. Part of reasoning systematically is having a general outline or an idea of what direction would be most helpful. In starting problem 3, planning for a radio station, 50% of THINKABOUT groups as well as 50% of the non-THINKABOUT groups began by listing specific ideas such as types of programs or types of equipment. The other half of the groups began by talking about steps in planning. As the groups responded to the questions, a third of them gave specific details that could be considered in planning, such as the need for a means to get Jim's spacecraft to the fair (problem 4) or scheduling programs for kindergarten children on the radio station. Thus, different groups of students were more systematic in their reasoning and procedures to solve the problems than other groups, but the more systematic groups were not just restricted to THINKABOUT classes.

The main characteristics of thinking flexibly that were sought were the consideration of alternatives, the generation of ideas (brainstorming), and the use of criteria. No characteristics were observed in the protocols that would indicate that THINKABOUT classes thought more flexibly than the non-THINKABOUT classes. Very rarely did any groups consider alternatives. The non-THINKABOUT groups used criteria or rated some form of a criteria in the same proportion as the THINKABOUT group. Only one group, a THINKABOUT group, specifically used the word criteria. Most groups generated responses as they came to mind, but rarely did the groups complete the brainstorming process by going back and selecting the most appropriate responses. Three groups, all from THINKABOUT classes, did use a form of brainstorming. One of these began by suggesting brainstorming as one way to help plan for the radio station, problem 3. These same groups were observed using characteristics of thinking flexibly, but these were isolated cases and difficult to relate to just the use of THINKABOUT.

Student and Teacher Discussion

Information from the teachers regarding how they used THINKABOUT helps to better understand what students reported about THINKABOUT. THINKABOUT was used in a variety of ways by the six teachers whose students were interviewed. The average classroom minutes spent on activities related to THINKABOUT by the six teachers are listed in Table 18. The teachers varied in their use of previewing activities (0-20 minutes), following discussion (0-20 minutes), and related assignments (0-60 minutes). One teacher, class 215, only used THINKABOUT once a week because scheduling made it impossible to view the programs broadcast on Monday. Even though students from these six classes all had viewed THINKABOUT, there was a large diversity among the classes in the instructional experience that students received regarding both time spent and activities performed.

Table 18
Time Spent on Activities Related to THINKABOUT
by Teachers Whose Students Were Interviewed

Class Number	Average Minutes per Week				THINKABOUT Activites Used
	Pre	Viewing	Post Discussion	Assignments	
115	10	30	20	0	1. Research on rabies 2. Spot ads over intercom
215	20	15	15	15	1. Developing colonies 2. Letter writing
126	5	30	5	40	1. Speeches (lang. arts) 2. Research projects (social studies)
226	10	30	0	10	1. Made a time capsule
136	0	30	15	15	1. Reporting 2. Research 3. Problem solving
235/6	0	30	0	60	1. Citizenship decision making (Addison (Wesley)

The difference in how THINKABOUT was used by the six teachers reflects the purposes that the teachers had for using THINKABOUT. Five of the teachers used THINKABOUT as enrichment for the traditional curriculum. Three of the teachers (215, 126, and 136) used THINKABOUT with a combination of content areas and two (115 and 226) viewed the series more as a subject matter in itself. One teacher (235/6) used THINKABOUT in conjunction with a decision-making curriculum. The teachers' reasons for using THINKABOUT varied from helping students to think--to be able to think and organize (226) and to develop independent thinking and problem-solving techniques (215)--to helping students with content-related skills--for more visual enrichment of the concepts of language arts and social studies (126) and to

develop study skills (136)--to helping students increase their decision-making skills (235/6).

The ratings of the six teachers on the success of THINKABOUT and reporting positive experiences varied some from the ratings of the larger group of teachers who completed the questionnaire. The latter group rated the success of THINKABOUT higher on strengthening the abilities of thinking flexibly followed by effectively expressing themselves, reasoning systematically, and then managing their own learning (p. 78). The six teachers felt THINKABOUT was more successful in strengthening their students' ability to effectively express themselves, followed by reasoning systematically. Some of the positive experiences of the six teachers in using THINKABOUT are:

- The eagerness to watch the program and discussions that referred back to programs (115).
- Observation of an increased awareness of the need to think (215).
- Enjoyment of viewing THINKABOUT (126).
- Students are more organized, plan time better, and are more independent (226).
- Better class participation (136).
- Solving playground problems in the classroom by working together (235/6).

Thus, the information collected from the six teachers indicates that the groups of students who were interviewed had different instructional experiences from using THINKABOUT, depending upon their class. Also, the student outcomes that were observed by the teacher varied from class to class.

The diversity of the instructional experiences among the classes helps to put in perspective the comments made by the students after completing the four problems. Besides the time spent viewing the programs, classes differed greatly in activities that were related to THINKABOUT.

One consistent comment about THINKABOUT made by students from all classes was that they liked the series. Comments like "neat," "pretty cool," "I love it," "pretty good," "I like it a lot," and "really good show" were frequently given by

the students when asked what they thought about THINKABOUT. Students particularly liked the use of kids in the series rather than adults: "The kids are about our age so (they) probably (do) something like we would do." The realism of the situations depicted was greatly appreciated: "It showed you how to deal with problems, not from someone saying ok, you were caught in a storm, this is what you would do. They act out in front of you problems that you could really do." The desire for realism was one reason one group of students did not like program 60, "Plan A City of the Future." This program was not realistic because "not very many kids build a city." Students liked programs where the ending was left for them to provide. The three continuous programs (57, 58, and 59) were very popular because they were longer and included more information. Students also liked THINKABOUT because they felt they learned something from the series, "it was educational."

Students easily and accurately recalled the stories of many of the programs, which indicated interest in the programs and some recall of facts. Frequently when talking about THINKABOUT, students mentioned the story from a program or a phrase that described the story. Programs recalled this way include the airplane crash (programs 57, 58, and 59), the moose program (program 42, "Maps and Models"), and the pond program (program 27, "Nature's Patterns").

The ability of students to understand the intended meaning of the programs and to apply ideas from the programs when solving problems was not as apparent. For example, one group of students from class 226 was asked what the pond program showed. Their response was, "Not to put a salt block by a pond or a river." When questioned further, one student responded, "I think it was something about problems. They were investigating it and kept studying what it was all about." The program tells about how Susan and her cousin, Howard, discover the reason why a pond's life cycle was disturbed: because rain would wash salt from a block of salt in a nearby

pasture into the pond. The program is from the "Finding Patterns" cluster. The main teaching points are that changes in nature's patterns may be a clue to a problem, patterns are recognized by making observations and performing experiments, and experimentation is a way of collecting information to answer specific questions. Students recalled the story of the program but did not give any indication that they remembered the main teaching points.

Students from different classes reported doing different types of activities in their classes related to THINKABOUT. What students recalled about a particular thinking skill or how they applied the ideas from the program appeared to be related to classroom discussions and activities, in addition to viewing the programs. Students from class 226 reported doing activities using brainstorming. One of the few groups of students who mentioned or performed a brainstorming process while solving the interview problems was from this class. On the other hand, students from this class generally reported the superficial meaning of the story from some programs, such as the pond program. The teacher of this class reported spending no time discussing programs (Table 18).

Students from class 115 regularly participated in discussions following the programs as reported by the teacher (Table 18) and the students. Students from this class saw a relation between the four interview problems and the THINKABOUT programs that discuss planning. They reported that they used information from the programs in working on hobbies, doing social studies, and solving daily problems. Students from class 136, which also spent time discussing programs, reported talking about criteria, what you can do if you do not have enough information, and how you can find out more from a book than you thought was there. One student from this class commented that sometimes the whole math class, 45 minutes, would be spent talking about a program. In class 126, there was little discussion of

programs, but students reported that they used brainstorming and criteria in class activities and that these helped. What students recalled and reported appears to be related to class dicussions and related activities. Students were able to recall very well the stories of the programs. When the ideas were supported by related activities, the students appeared to get more meaning and were better able to apply the ideas.

Students did report applying ideas from the programs in school and in their everyday lives. Students from class 115 divided the work among students assigned to work together on a social studies project. Students from classes 126, 226, and 235/6 used brainstorming. One class, 126, brainstormed to help generate rules for their class. Students from several of the classes used criteria but had different conceptions of what critera are. Students from class 115 interpreted using criteria as outlining. Students from class 126 thought that getting information was using criteria. Students from class 136 gave as an example of talking about criteria when you talk about how you can find the answer. Students from 235/6 resolved fights by using critera. Students from class 226 reported organizing material or a store, making time capsules, and considering punctuation in writing reports. The program about patterns was used by students from class 235/6 in studying the murders of children in Atlanta.

Only some of the groups of students reported using ideas from THINKABOUT in solving everyday problems. Students from class 115 gave as examples decorating a room, resolving a conflict between practice for soccer and baseball both scheduled at the same time, and coordinating with family members in order to be transported to go skating. Students from class 136 reported relating back to programs and using the way problems were solved in the programs to solve everyday problems, "You can jump back to what they did." Other students use ideas from THINKABOUT in

sorting ideas, to think about the best thing to do, and to meet deadlines. One student only used THINKABOUT on occasion, "I only do it when I get into trouble."

Only a few groups of students found any relationship between THINKABOUT programs and solving the four interview problems. Students from class 215 made general comments that they thought they could have done as well if they had not watched THINKABOUT. The need for planning, discussed in THINKABOUT, was seen by students from class 115 to be needed in solving the problems. Students from class 126 had not seen problems like the four problems before, but thought that brainstorming, using criteria, setting up diagrams, and organizing information helped in solving the problems. Other than these examples, groups could not make direct connections between THINKABOUT and solving the interview problems.

The students from the two classes which had not used THINKABOUT had had some experience with projects and solving problems, but not to the same extent as the THINKABOUT classes. The non-THINKABOUT students were more limited in experiences related to problem solving. Students from class 315 had worked on projects and reports using encyclopedias. When they were interviewed, they were doing a project on the human body requiring making diagrams of the human skeleton. The main sources of information that groups of students from this class consistently gave when asked what they would do when confronted with a problem they could not solve were the teacher, a grown up, and an encyclopedia. "I kick myself" was one student's response to what he would do to help think of an answer. Students from class 326, the sixth grade non-THINKABOUT class, had done some problem solving with the counselor. A group met with the counselor and students put problems into a box. Problems then were drawn from the box and solved by the group. Students from this class said that they had never seen problems like the ones they were given in the interview. Math and science were areas that were given as school things that

would help in solving the problems. A dealer or library were given as sources of information. One student from each group knew something about brainstorming. None of the groups knew what criteria or blockbusting meant. Alternatives for one group were different people, different ways, or different solutions. From the discussion with the students from THINKABOUT classes and non-THINKABOUT classes, students had had different experiences and the differences became apparent as the students talked about what they would use to solve problems.

CONCLUSIONS AND LIMITATIONS

This study is more hypothesis generating than hypothesis testing, more ethnographic than experimental, and more information collecting than issue resolving. The main purpose of the study is to provide information that can be used to make decisions about instructional support for THINKABOUT in Wisconsin and for future instructional television series. Controlling factors on the scope of the study were time, money, available personnel, and willingness of teachers and students to participate. Most of the data collection and analysis was done by one person with an occasional check of reliability from another person. The study does provide information on how some Wisconsin teachers are using THINKABOUT and on how THINKABOUT has affected some students. The validity of the conclusions of the study are based on a detective model where more credence is given to information that is substantiated by a variety of sources and by its reasonableness.

The sources of information for this study were questionnaires completed by 58 teachers who were using THINKABOUT during the 1980-81 school year, questionnaires completed by seven teachers who had used THINKABOUT the previous year but were not using the series during the 1980-81 school year, responses and protocols of 24 groups of students solving four problems, discussions by these groups of students, and questionnaires of 29 students who had viewed THINKABOUT during the 1980-81 school year. The 24 groups of four students each came from eight classes, three groups from each class. Two of the classes had not viewed THINKABOUT. All of the data was collected during April and May 1981.

Descriptive statistics were computed for the questionnaire items. Nine of the teachers who completed questionnaires were interviewed by telephone to validate information from the questionnaire and to provide more detail. Each group of

students who worked on the four problems was given a score or scores on each of the problems. Class scores on each problem were computed by taking the average scores of the three groups from the class for problems 1 and 2, and the sum of scores for each group on problems 3 and 4. Verbatim transcripts were made of the student interaction while students solved the four problems. These protocols were analyzed by identifying specific examples and evidence of the four general characteristics of independent learners emphasized in THINKABOUT--expressing themselves effectively, managing their own learning, reasoning systematically, and thinking flexibly. Processes used by all of the three groups from the same class were identified as a characteristic of the class.

The estimate of the percentage of Wisconsin grade 5 and grade 6 teachers using THINKABOUT during the 1980-81 school year is 26%. Most teachers used THINKABOUT because the series emphasizes reasoning, thinking, problem solving, and decision making. The decision to use THINKABOUT was most frequently made by the teacher. Two-thirds of the teachers used two programs a week. On the average, 18 minutes a week were spent on activities related to THINKABOUT in addition to time spent viewing the programs--six minutes in previewing activities and 12 minutes in discussions following the programs. Two-thirds of the teachers did some form of previewing activities, and 88% engaged in some follow-up discussions. Two-thirds of the teachers did not do any other in-class assignments related to THINKABOUT. The ones that did do assignments mainly did activities from the teacher guide, used by 70% of the teachers. Very few of the teachers mentioned any materials that they had prepared to use along with THINKABOUT.

What are the effects of THINKABOUT on teachers, students, and instructional programs?

Teachers and students who had viewed THINKABOUT were very positive toward the series. Nearly all of the teachers (97%) and most of the students (75%) gave the series a positive rating. The groups of students who were interviewed and who had used THINKABOUT all had positive experiences with the series. Their appreciation of the series came out in their eagerness to discuss programs and to relay experiences they had had that were related to THINKABOUT programs. Teachers and students liked some programs better than others, but favorite programs were spread over the 60 possible, indicating the diversity of the programs in the series. Reasons given for the appreciation of the series by teachers were the high interest level of their students in the series and the student learning that took place from the programs.

The evidence is mixed on the effects of THINKABOUT to strengthen the four qualities of independent learners and problem solvers that the series was designed to develop in young learners. There is some evidence that the use of THINKABOUT is related to students more effectively expressing themselves. In solving the problems, the THINKABOUT students were much more comfortable in expressing ideas to the group and engaging in dialogue with other students than were the students who had not used THINKABOUT. Both groups, the six teachers of the students who were interviewed and the 58 teachers who completed the questionnaire, gave a high mean rating to the success of THINKABOUT in strengthening the students' ability to effectively express themselves compared with ratings of the other three abilities. This impression of the teachers and the results of the interviews, along with the results of the AIT impact study regarding certain communications skills, provide evidence that using THINKABOUT does relate to students being better able to

effectively express themselves. One caution in interpreting these results as causal is that teachers who are more interested in having their students express themselves may choose to use THINKABOUT because the series supplements what they find is important. This is different from THINKABOUT being a prime cause of more effective communication. Information from this study does not differentiate between the two cases. The data does indicate that 88% of the teachers completing the questionnaire had students participate in discussions following the viewing of programs. No information was collected regarding the extent that students from the non-THINKABOUT classes participated in class discussions. Even though it is impossible to say that THINKABOUT is a cause of students being able to more effectively express themselves, there appears to be a relationship between the use of the series and the ability.

THINKABOUT students exhibited some attributes that would help in managing their own learning that were not exhibited by most of the non-THINKABOUT students. In solving the four problems, THINKABOUT students would build upon ideas given by other members of the group, clarify an idea given by another member, and evaluate ideas on occasion. Non-THINKABOUT students were rarely observed doing any of these actions. One outcome of clarifying ideas, building upon ideas, and evaluating is that the THINKABOUT students responded to problem 4 with more strategic responses, responses related to planning, than did the non-THINKABOUT students. As a result, THINKABOUT students appeared more systematic and reflective, particularly when solving a structured and realistic situation such as planning a science project. Another indication of THINKABOUT students possibly being able to manage their own learning better is their willingness to work harder on a project when confronted with time constraints rather than just reducing the scope of the project. How students apply what was observed in the interview situation to taking charge of

their own learning in school is questionable, since teachers rated THINKABOUT the least successful in strengthening their students' ability to manage their own learning than in strengthening any of the other three abilities. THINKABOUT students did exhibit beneficial characteristics related to managing their own learning in the restricted situation of solving the interview problems that were not exhibited by the non-THINKABOUT students.

Differences were not observed between THINKABOUT students and non-THINKABOUT students in their ability to reason systematically. All groups had difficulty in making inferences and drawing conclusions. In other aspects of reasoning systematically, such as using a criteria or noting conditions of the problem, differences were noted among groups, but the differences were due to the particular group rather than to the use of THINKABOUT. Nearly half of the teachers who responded to the questionnaire reported some success of THINKABOUT in strengthening their students' ability to reason systematically. Whatever benefits to using THINKABOUT that teachers observed regarding reasoning systematically, the benefits were not observed in the interviews.

Evidence from the study indicates that THINKABOUT was related to more flexible thinking by students. The THINKABOUT students at both grades 5 and 6 listed a greater variety of information sources than did the non-THINKABOUT students on one part of problem 4. Other differences were more noticeable at the fifth grade level. The fifth grade THINKABOUT students had more breadth in their responses, a variety of different responses, whereas the non-THINKABOUT students had more depth in their responses, a number of related responses. On a few isolated instances, groups who had viewed THINKABOUT did some form of brainstorming and did mention noting criteria. None of the non-THINKABOUT students used any of these techniques. Many teachers felt THINKABOUT affected flexible thinking in their students, with nearly

50% of the teachers rating the success of the series positively in strengthening this ability in their students.

Even though THINKABOUT students did not all use techniques from the series to help in their thinking, the students were at least aware of the techniques, could describe them, and could refer to them by name. Only a very few of the non-THINKABOUT students knew about brainstorming and had difficulty in explaining the technique. None of the non-THINKABOUT students knew the meaning of criteria or blockbusting. Another factor related to students thinking more flexibly was the use in the classroom of skills related to flexible thinking. Those THINKABOUT students who used brainstorming while solving the interview problems were the ones who reported doing brainstorming in class in addition to viewing THINKABOUT. The results suggest that THINKABOUT provides the potential to help students think more flexibly, which is realized through classroom and other support activities.

The relation of THINKABOUT to strengthening students' ability to be better problem solvers and independent learners is corroborated by two sources. Nearly half of the teachers who responded to the questionnaire felt that THINKABOUT had some success in strengthening these abilities. The series was felt to be successful in strengthening problem solving by more teachers than in strengthening independent learning, 52% compared to 43%. Most of the other teachers were neutral toward THINKABOUT's success in these areas. Another indication of teachers' impression that THINKABOUT has some benefit in problem solving and independent learning is that these outcomes were included frequently in the reason why the series was being used. A second source providing evidence of THINKABOUT success in effecting these abilities in students is the observation of facets of three of the four qualities--effective expression, management of own learning, and flexibile thinking--of these abilities as students solved problems. As noted, THINKABOUT

students were observed using some facets of these qualities more frequently than were non-THINKABOUT students. Since the report of teachers regarding the success of THINKABOUT in strengthening these two very complex abilities in students was positive but not overwhelming, and since THINKABOUT students did not outshine non-THINKBOUT students in all areas, THINKABOUT alone does not constitute, nor is it designed to be, a complete curriculum on problem solving and independent learning. THINKABOUT does appear to supplement the growth of these two abilities in students.

What students recalled from the programs and their application of the ideas from the programs corresponded to the amount of class discussion and related activities that occurred. THINKABOUT students who mentioned brainstorming or used the technique while solving the interview problems were those who reported using the technique in some class activities. Other THINKABOUT students knew what brainstorming was but were not observed using it. Most non-THINKABOUT students did not know what brainstorming was. Students from classes who regularly participated in discussions of the programs were better able to relate programs to solving the interview problems and were better able to discuss the meaning from the programs rather than just the story. Thus, THINKABOUT students appeared to get more meaning and were better able to apply the ideas from programs when the ideas were reinforced by discussions and related classroom activities.

There was some evidence that THINKABOUT provided an enriched experiencial base for the THINKABOUT students that the non-THINKABOUT students did not have. This enriched experience included program stories; a different vocabulary including words such as brianstorming, criteria, and resources, to name a few; and the application of thinking skills. This experience provides a basis from which more involved work in developing thinking skills can take place.

What instructional support do teachers need to implement THINKABOUT more effectively?

Even though most teachers had not received any in-service on using THINKABOUT, only a third of the teachers expressed any interest in having an in-service or in meeting with other teachers who are using THINKABOUT. Not having enough classroom time for activities is a major factor of not being interested.

Most of the teachers did not feel that the suggested materials on the questionnaire would be very useful. The materials, listed in their rated order of usefulness, were duplicating masters, teaching posters, and learning games. Again, time pressures felt by teachers would result in such materials not being used. Some teachers mentioned the need for more suggestions of activities or follow-through materials for each program.

Even though few teachers expressed interest in attending an in-service, there is one indication that teachers can benefit from an in-service providing it addresses some of the real problems that teachers face. Teachers, on the average, do not spend a large amount of time on THINKABOUT and related activities. The mean amount of classroom time spent a week related to THINKABOUT was 48 minutes. Since two programs are shown in a week, this breaks down for each program to 3 minutes for previewing activities, 15 minutes for the program, and 6 minutes for discussion following the program. Only one-third of the teachers did any other type of activities. Some teachers expresed frustration in not having enough time to do follow-up activities. One reason that some teachers did not do many activities from the teacher guide was because they were too time consuming. On the other hand, some teachers have integrated THINKABOUT activities in their regular curriculum and have found these activities to be supportive of their goals. Thus,

a major problem felt by some teachers, time constraint, was not a concern to other teachers.

An in-service on THINKABOUT which deals with finding time to do THINKABOUT activities may be of value. Such an in-service can have two emphases. One is to help teachers fit THINKABOUT activities into their basic curriculum--language arts, social studies, and mathematics. This emphasis would help teachers see that the activities are a part of the content areas rather than an addition to these areas. A second emphasis is to have teachers who have successfully found time for THINKABOUT activities to explain the kind of things they do and how THINKABOUT ideas are reinforced throughout their instructional program.

What can be done to expand the use of THINKABOUT in Wisconsin?

No particular characteristics describe a teacher who is a potential user of THINKABOUT with the exception that the teacher has used other ITV series. Based on the teachers in Wisconsin who are using THINKABOUT, the series appeals to a diverse group. THINKABOUT teachers vary greatly in their years of teaching experience, teach both in self-contained and team teaching situations, and vary in their content area specialties. The one common experience of THINKABOUT teachers is that nearly all (88%) have used other ITV series.

Teachers who are potential users of THINKABOUT can be partitioned into two groups, each with its own concern. One group is the fifth and sixth grade teachers who are not using THINKABOUT at schools where other teachers are using THINKABOUT. A concern of this group is showing programs from the series to the same group of students twice, both at fifth grade and sixth grade. Different schools have handled this situation by showing the series to both fifth and sixth graders every other year, or by dividing the programs into two sets--those to be shown to fifth

graders and those to be shown to sixth graders. One student in the interview who had viewed THINKABOUT the year before at another school enjoyed seeing some of the programs a second time. He was better able to understand what was in the program the second time. This responds to some teachers' hesitations of showing the program to students a second year.

The second group of teachers who are potential users are those at schools where THINKABOUT is not being used. These teachers are probably less familiar with THINKABOUT and need more information about what THINKABOUT is and its potential effects. The enthusiasm that many teachers expressed in this study may be an enticement for these teachers.

The most effective channels for information is direct information to the teacher. In three out of four cases, the teacher was the one most influential in deciding to use THINKABOUT. The materials from which most teachers initially heard about THINKABOUT were those that went directly to or were used by teachers, the Parade of Programs and mailed brochures. These both are means of providing information to teachers who are potential users of THINKABOUT.

What implications are there from the implementation of THINKABOUT over two years for the support and production of future instructional television series?

THINKABOUT and its effects have implications to other ITV series for this age level, particularly in identifying features of the series that appeal to the students. Students were very positive toward viewing kids their own age solving real life-like problems. The programs were relevant and dealt with situations that fifth and sixth graders could identify with. Students liked having open-ended programs where answers were left for them to contribute. The three-program serial was well received because the story was extended over a longer period of time and

was more developed. This is a contrast to most ITV series where each 15-minute program is designed to be self-contained.

The results of this study point to the importance of classroom activities in having students apply the ideas presented in the programs. The programs provide an enriched experience for THINKABOUT students to draw from. However, the ideas planted by the programs need to be cultivated by additional activities to be fully realized. There was some indication of the need to include in the teacher guide well specified and ready-to-use activities. Although the guide was highly thought of, some teachers suggested including less time-consuming activities. Such activities would respond to the time restraints that teachers feel and to the need for doing activities to obtain the greatest benefits from the programs.

The story lines of the programs helped students to recall what happened in the programs and the skills that were presented. Students could recall many of the programs and describe the story in some detail. The recollection of the story, however, did not mean that the students would apply the skill presented or could generalize beyond the situation depicted. Follow-up activities and classroom applications of the skills aided students in applying the skills.

Limitations

The number of teachers (65) and the number of students who participated in this study are small. The participants were volunteers that constituted a sample of convenience rather than a random sample. Because of this there is a question about the generalizability of the results of the study to a larger population other than to those who participated in the study. The teachers and students did come from schools located in different sizes of communities and from six different areas of Wisconsin. The means of standardized achievement scores of the classes of students

who were interviewed were slightly above grade level. The students and teachers who participated in the study came from schools which were characteristic of many schools in Wisconsin. However, because the numbers were small, the teachers and students included in the study cannot be assumed to be a representative sample of those in Wisconsin, which limits the generalizability of the study.

There is some difficulty in sorting out effects due to THINKABOUT from other classroom experiences. Students were only tested once. The two non-THINKABOUT classes were selected to match some characteristics of the THINKABOUT classes but some differences among the classes were not controlled, such as teaching style, content covered, and previous instructional experiences. Attempts were made in the study to substantiate information from different sources in order to form relationships with THINKABOUT. The control classes allowed contrasts to be made and helped to highlight differences that appear to be related to THINKABOUT. However, for results to be unequivocally attributed to THINKABOUT much stronger controls need to be used.

The procedure of the study was designed to generate information and not to test hypotheses. As a result, not all groups of students were asked the same questions. Instead, questions were asked to clarify the students' responses and to better understand their instructional experiences. A scoring scheme was adopted to provide scores for problems 1 and 2. The scheme was designed to take into consideration the understanding of the problem, means used to solve the problem, and the answer. Other scoring schemes may have resulted in other differences among groups on their scores for those problems. Scoring on these problems was done by one person without a reliability check. The scheme to score problem 4 had been used in other studies, making the results on this problem more applicable for comparison to those of other studies. Information was collected for groups and classes and not for

individual students. There may be particular effects of THINKABOUT on individual students, but this study was not designed to identify these. The procedures do provide information about groups of students and how classes of students responded to THINKABOUT.

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Appendix A

Teacher Questionnaires

Appendix A

Teacher Questionnaires

Included in this appendix are two questionnaires and the form used in interviewing teachers over the telephone. The first questionnaire was sent to the teachers who were using THINKABOUT. The second was sent to the teachers who had used THINKABOUT the school year 1979-80 but were not using it the school year 1980-81. The means and percentages of the responses are included on the questionnaires. A total of 58 teachers responded to the questionnaire who were using THINKABOUT and seven who were not currently using THINKABOUT but who had used it the previous year.

ThinkAbout Teacher Survey
Wisconsin Educational Television Network
May 1981

Code No. _____
Grade _____

DIRECTIONS: Please circle the appropriate number for each item or fill in your responses.

Section A: BACKGROUND INFORMATION

1. How many years of full-time teaching experience do you have? $\bar{x}$ = 15.05 _____ years S.D. = 1.5

2. Which best describes the setting in which you teach?
   - 43% 1. Self-contained classroom
   - 47% 2. Units or team teaching
   - 7% 3. Departmental by subject (specify) _____
   - 3% 4. Other (please specify) _____

3. Is there a content area that you consider your speciality?
   - 40% 1. No
   - 50% 2. Yes (specify) _____

4. How many teachers teach grade 5 and/or 6 in your school? $\bar{x}$ = 4.4 _____ Teachers S.D. = 2.19

5. How many of these teachers are using ThinkAbout? $\bar{x}$ = 2.4 _____ Teachers S.D. = 1.36

6. Are any other teachers in your school using ThinkAbout?
   - 51% 1. No
   - 49% 2. Yes (explain) _____

7. How is ThinkAbout being used?
   - 34% 1. As a subject matter in itself
   - 9% 2. Only as part of language arts
   - 3% 3. Only as part of social science
   - 0% 4. Only as part of mathematics
   - 47% 5. With a combination of content areas
   - 7% 6. Other (specify) _____

8. How is ThinkAbout used in relation to traditional curriculum material (e.g. textbook)?
   - 0% 1. As an alternative or replacement
   - 31% 2. As a supplement or addition
   - 67% 3. As enrichment
   - 2% 4. Other (specify) _____

9. What is the total number of your students using ThinkAbout? $\bar{x}$ = 55.10 _____ Students S.D. = 43.65

10. What groups of your students are using ThinkAbout?
    - 90% 1. All
    - 10% 2. Special groups only (specify) _____

11. Who was most influential in the decision to use ThinkAbout?
    - 0 1. State
    - 5% 2. Central administration
    - 5% 3. Building principal
    - 3% 4. Media specialist
    - 24% 5. You
    - 19% 6. Other teachers
    - 19% 7. ITV representative
    - 3% 8. Combination of above or other (specify) _____

12. Where or from whom did you first hear about ThinkAbout?
    - 2% 1. Professional meeting
    - 7% 2. ITV representative
    - 40% 3. Parade of Programs
    - 3% 4. Workshop
    - 17% 5. Other teachers
    - 7% 6. Building principal
    - 36% 7. Mailed brochure
    - 9% 8. Other (specify) _____

13. What in-service have you received on using ThinkAbout?
    - 33% 1. None
    - 3% 2. School workshop (presented by _____ _____)
    - 3% 3. District workshop (presented by _____)
    - 6% 4. Regional workshop (presented by _____)
    - 0 5. Other (specify) _____

14. Is ThinkAbout the first ITV series you have used?
    - 11% 1. Yes
    - 88% 2. No (specify others you have used) _____

SECTION B: USE OF ThinkAbout

15. What is the main reason you are using ThinkAbout?

16. How do you view ThinkAbout?
50% 1. Live basis
41% 2. Tape delayed basis
9% 3. Other (specify) _____

17. When did you begin using ThinkAbout?
_____ Month _____ Year 2% 8/79 58% 1/80
28% 9/79 36% 9/80
49% 10/79 3% 1/80
39% 11/79 3% 1/81

18. How many minutes do you average each week on these activities related to ThinkAbout?

Previewing discussion or activities	4: 7.08	1. _____ Minutes
Viewing the programs	25.95	2. _____ Minutes
Discussions immediately following programs	12.45	3. _____ Minutes
Other in-class assignments directly related to ThinkAbout	5.57	4. _____ Minutes
Total minutes spent on ThinkAbout per week (Sum of the four times above)	48.0	5. _____ Minutes

16% 5-30min, 35 to 56 min, 45% , some 3.3%

19. Of the 60 programs, how many different ThinkAbout programs have your class viewed this school year? 4: 43.03 _____ Programs 45% 60 programs

20. If you used less than 60 programs, what criteria did you use to select the programs that you viewed?

21. What are the program numbers of the best three programs in the ThinkAbout series?
1. program _____
2. program _____
3. program _____

22. What are the program numbers of the worst three programs in the ThinkAbout series?
1. program _____
2. program _____
3. program _____

23. What are activities or projects that your class(es) has (have) done that are related to ThinkAbout?

SECTION C: SUPPORT OF THINKABOUT

24. How would you rate the Teacher's Guide?

	Do not have one	Very Poor				Excellent
	0	1	2	3	4	5
4: 3.97	29%	0	3%	17%	29%	21%

25. What in the Teacher's Guide should be changed to make it more useful?

26. Please indicate how important it would be to have each of the following materials to supplement the Teacher's Guide:

	Not Necessary		Useful		Very Useful		Essential	
Set of workbooks	46%	1	16%	2	10%	3	5%	4
Set of duplicating masters	26%	1	18%	2	31%	3	9%	4
Set of learning games	24%	1	33%	2	28%	3	7%	4
Set of teaching posters	19%	1	29%	2	37%	3	9%	4
Other (please specify) _____	14%	1	31%	2	29%	3	22%	4

27. Please indicate your preference for the context in which these materials (workbooks, duplicating masters, learning games, teaching posters, etc.) should present ThinkAbout stories and activities: (please circle all that apply)

21%
2%
1. Context of everyday situations 67%
2. Subject related context
   a. Language arts 26%
   b. Science 14%
   c. Social studies 22%
   d. Other subjects 7%
3. Other _____
_____ (please specify)
_____ (please specify)

28. What could be done to help you implement ThinkAbout more effectively?

29. What supplementary materials have you prepared to use with ThinkAbout?

30. Would you be willing to share these materials with other teachers using ThinkAbout? 1. Yes 19% 2. No 12%

31. Would you like to meet with other teachers from your area who are using ThinkAbout? 1. Yes 24% 2. No 24%

32. If so, when are some good times for you to meet during the school year?

33. Would you like to have an in-service on ThinkAbout? 1. Yes 38% 2. No 26%

SECTION D: IMPACT OF ThinkAbout

		Very Poor	Poor	Mixed Feelings	Good	Excellent
34. What is your overall rating of ThinkAbout?	4.44	1	2	3 30%	4 22%	5 6%
		Strongly Disagree				Strongly Agree
35. The reaction of my students to ThinkAbout is highly favorable.	4.40	1	2	3 24%	4 31%	5 6%
36. I bring up ideas from ThinkAbout programs when teaching other subjects.	3.74	1 2%	2 2%	3 24%	4 40%	5 25%
37. My students bring up ideas from ThinkAbout programs when studying other subjects.	3.31	1	2 7%	3 40%	4 28%	5 10%
38. ThinkAbout programs arouse discussion in my class(es).	3.43	1 2%	2 5%	3 22%	4 38%	5 22%
39. Most of my students participate in discussions of ThinkAbout programs.	3.57	1 2%	2 10%	3 21%	4 38%	5 24%

We are interested in your perception of the degree to which ThinkAbout was helpful in improving the skills of your students. For each item listed below, please rate by circling a number from 0 to 5 (0 to indicate not at all helpful, and 5 to indicate extremely helpful), the degree to which ThinkAbout was helpful to your students in improving their skills in...

		Not at all helpful					Extremely helpful
40. finding alternatives.	4 = 3.05	0	1	2	3	4	5
41. estimating and approximating.	2.91	0	1	2	3	4	5
42. giving and getting meaning.	3.14	0	1	2	3	4	5
43. collecting information.	3.40	0	1	2	3	4	5
44. classifying.	3.36	0	1	2	3	4	5
45. finding paterns.	3.24	0	1	2	3	4	5
46. generalizing.	3.19	0	1	2	3	4	5
47. sequencing and scheduling.	3.22	0	1	2	3	4	5
48. using criteria.	3.41	0	1	2	3	4	5
49. reshaping information.	3.22	0	1	2	3	4	5
50. judging information.	3.52	0	1	2	3	4	5
51. communicating effectively.	3.48	0	1	2	3	4	5
52. solving problems.	3.71	0	1	2	3	4	5

How would you rate the success of ThinkAbout in strengthening your students' ability to...		Very low level of success				Very high level of success
53. be problem solvers.	M= 3.58	1	2	3	4	5
54. be independent learners.	3.45	1	2	3	4	5
55. effectively express themselves.	3.50	1	2	3	4	5
56. manage their own learning.	3.24	1	2	3	4	5
57. reason systematically.	3.42	1	2	3	4	5
58. think flexibly.	3.59	1	2	3	4	5

59. Please identify some of your positive experiences with the ThinkAbout series.

60. Please identify some of your negative experiences with the ThinkAbout series.

Comments:

Previous Users
ThinkAbout Teacher Survey
Wisconsin Educational Television Network
May 1981

For teachers not using ThinkAbout this year.

Code No. _____
Grade _____

DIRECTIONS: Please circle the appropriate number for each item or fill in your responses.

Section A: BACKGROUND INFORMATION

1. How many years of full-time teaching experience do you have? $\bar{x} = 12.6$ _____ years

2. Which best describes the setting in which you teach?
   - 14% 1. Self-contained classroom
   - 57% 2. Units or team teaching
   - 3. Departmental by subject (specify) _____
   - 28% 4. Other (please specify) _____

3. Is there a content area that you consider your speciality?
   - 71% 1. No
   - 14% 3. Yes (specify) _____

4. How many teachers teach grade 5 and/or 6 in your school? $\bar{x} = 7.0$ _____ Teachers

5. How many of these teachers are using ThinkAbout? $\bar{x} = 3.4$ _____ Teachers

6. Are any other teachers in your school using ThinkAbout?
   - 57% 1. No
   - 14% 2. Yes (explain) _____

7. How did you use ThinkAbout?
   - 14% 1. As a subject matter in itself
   - 14% 2. Only as part of language arts
   - 14% 3. Only as part of social science
   - 4. Only as part of mathematics
   - 28% 5. With a combination of content areas
   - 28% 6. Other (specify) _____

8. How did you use ThinkAbout in relation to traditional curriculum material (e.g. textbook)?
   - 1. As an alternative or replacement
   - 29% 2. As a supplement or addition
   - 57% 3. As enrichment
   - 4. Other (specify) _____

9. What was the total number of your students using ThinkAbout? $\bar{x} = 74$ _____ Students

10. What groups of your students used ThinkAbout?
    - 100% 1. All
    - Special groups only (specify) _____

11. Who was most influential in the decision to use ThinkAbout?
    - 1. State
    - 2. Central administration
    - 3. Building principal
    - 4. Media specialist
    - 57% 5. You
    - 28% 6. Other teachers
    - 7. ITV representative
    - 8. Combination of above or other (specify) _____

12. Where or from whom did you first hear about ThinkAbout?
    - 14% 1. Professional meeting
    - 2. ITV representative
    - 14% 3. Parade of Programs
    - 4. Workshop
    - 5. Other teachers
    - 6. Building principal
    - 42% 7. Mailed brochure
    - 8. Other (specify) _____

13. What in-service have you received on using ThinkAbout?
    - 86% 1. None
    - 2. School workshop (presented by _____)
    - 3. District workshop (presented by _____)
    - 4. Regional workshop (presented by _____)
    - 5. Other (specify) _____

14. Is ThinkAbout the first ITV series you have used?
    - 29% 1. Yes
    - 71% 2. No (specify others you have used) _____

SECTION B: USE OF ThinkAbout

15. Why are you not using ThinkAbout this year? (Please be specific)

16. Do you plan on using ThinkAbout next year? 1. Yes 2. No

17. Approximately how many of the 60 programs did you use last year? $\mu = 36$ _____ programs

18. What type of supplemental materials did you use with ThinkAbout last year?

19. What suggestions do you have for support materials, like workbooks or duplicating masters, to make ThinkAbout more effective?

How important are these goals for your students' instructional program? For your students to...		Not Important				Very Important
20. be problem solvers.	$\mu = 4.8$	1	2	3	4	5
21. be independent learners.	4.75	1	2	3	4	5
22. effectively express themselves.	4.25	1	2	3	4	5
23. manage their own learning.	4.42	1	2	3	4	5
24. reason systematically.	4.58	1	2	3	4	5
25. think flexibly.	4.33	1	2	3	4	5
How would you rate the success of ThinkAbout last year in strengthening your students' ability to...		**Very low level of success**				**Very high level of success**
26. be problem solvers.	$\mu = 3.8$	1	2	3	4	5
27. be independent learners.	3.8	1	2	3	4	5
28. effectively express themselves.	3.8	1	2	3	4	5
29. manage their own learning.	3.4	1	2	3	4	5
30. reason systematically.	3.2	1	2	3	4	5
31. think flexibly.	4.0	1	2	3	4	5

32. What differences have you observed in your students this year from your students last year in their thinking skills, problem solving, and independent learning that may be attributed to not using ThinkAbout?

		Very Poor				Excellent
33. What is your overall rating of ThinkAbout?	$\mu = 4.17$	1	2	3	4	5
					71%	14%

34. Please identify some of your positive experiences with the ThinkAbout series.

35. Please identify some of your negative experiences with the ThinkAbout series.

Comments: _____

Telephone Interview Form
THINKABOUT Evaluation
May 1981

Date: _____ Interviewer: _____
Teacher's Name: _____ Code No.: _____
School: _____ Grade: _____
City/Town: _____
Phone Number: _____

Hello:

I am _____(your name)_____ and I work for the Wisconsin Educational Communications Board. About two weeks ago we sent you a letter and a questionnaire regarding the television series THINKABOUT. (Pause and let the teacher confirm receiving the letter.) I would like to ask you seven questions about your use of THINKABOUT if you have time now. (If not, "What is a convenient time for me to call again?")

(If the teacher has time, proceed with the questions.)

1. Did you elect to use THINKABOUT because it fits well into your existing program, or because it offers something different from what you normally emphasize?

2. Do you use THINKABOUT as part of a particular subject matter? If so, which one? (Probe to find out if THINKABOUT is used separately or to supplement other subject areas--social studies, language arts, mathematics, etc.)

3. What activities related to THINKABOUT do you do with your students, and what approximate classroom time per week is spent for each? (Try to get information on pre-program discussions, number of programs viewed each week, and post-program activities, as well as any projects or other activities directly related to THINKABOUT.)

4. What have you found to be the most effective way of using THINKABOUT with your students? (Probe to find out how THINKABOUT has been adapted to the teacher's program.)

5. What do you feel your students have gained from viewing THINKABOUT? (Try to get specific examples of students applying content from THINKABOUT to their lives at school or home.)

6. What could be done to make your use of THINKABOUT more effective? (Some ideas may be to provide supplemental material, to have student review sheets, to provide a list of student projects, or to have an in-service.)

7. Do you know of any other teachers who are using THINKABOUT in a special way that we should know about? (Try to get names.)

Thank you for your time. This summer a report will be written based on your responses and those of other teachers. A copy of this report will be sent to you in September.

Appendix B

Student Questionnaire

Appendix B

Student Questionnaire

Included in this appendix is the questionnaire given to some students of six teachers. Questionnaires were received from a total of 29 students from classes of five of the teachers. The means and frequencies of responses are included on the form.

Community _____ No. _____

Student Survey on ThinkAbout

We are interested in your personal and honest opinions of the ThinkAbout series. Please circle the answer which best fits your feelings or opinions. Your answers are very important to us so please answer all questions by yourself. When completed, return your questionnaire to your teacher. Thank you.

Look at each of the statements made about the ThinkAbout program. If you agree with a statement, draw a circle around either Strongly Agree (5) or Agree (4). If you disagree, draw a circle around either Strongly Disagree (1) or Disagree (2). The question mark (3) means that you cannot decide.

N=29	Mean	Strongly Agree	Agree	?	Disagree	Strongly Disagree
1. ThinkAbout programs help me to come up with new ideas.	4.10	5 38%	4 38%	3 21%	2 3%	1
2. ThinkAbout programs are not useful in solving my own problems.	2.24	5 3%	4 7%	3 28%	2 34%	1 28%
3. ThinkAbout helps me to think in new and different ways.	3.72	5 17%	4 55%	3 17%	2 3%	1 7%
4. ThinkAbout programs help me to learn on my own.	3.62	5 21%	4 34%	3 34%	2 7%	1 3%
5. ThinkAbout programs help me to say better what I really want to say.	3.21	5 7%	4 38%	3 28%	2 24%	1 3%
6. ThinkAbout has shown me how to solve problems on my own.	3.45	5 24%	4 17%	3 45%	2 7%	1 7%
7. ThinkAbout has helped me learn better ways to solve problems.	4.03	5 24%	4 59%	3 14%	2 3%	1
8. ThinkAbout helps me to organize my thinking.	3.76	5 21%	4 41%	3 31%	2 7%	1
9. ThinkAbout helps me to see more than one way to solve a problem.	4.31	5 52%	4 31%	3 14%	2 3%	1
10. ThinkAbout programs show me how to think clearly, step by step.	3.59	5 17%	4 41%	3 28%	2 10%	1 3%
11. I want to learn more about the things I see in ThinkAbout programs.	3.72	5 24%	4 31%	3 38%	2 7%	1
12. I like ThinkAbout very much.	4.21	5 55%	4 21%	3 17%	2 3%	1 3%

13. What is your sex? 1 48% male 2 52% female

14. What grade are you in? 4 5 (41%) 6 (55%) 7 8

15. What two (2) ThinkAbout programs did you like the most? 58(n=5), 57(5), 56(4), 2(4), 59(3)

16. What two (2) ThinkAbout programs did you like the least? 36(4), 5(3), 60(3), 33(3), 51(3)

Thank you very much!

Appendix C

Four Interview Problems and Scoring Schemes

Appendix C

Four Interview Problems and Scoring Schemes

Included in this appendix are the four problems given to groups of four students each to solve. The scoring scheme is included for problems 1, 2, and 3. The scheme for problem 4 can be obtained from the Agency for Instructional Television (AIT), Box A, Bloomington, Indiana 47402.

Problem 1

Can nine marbles be distributed into five cups with a different number of marbles in each cup?

Explain your answer.

Scoring Scheme: Total points possible: 10.

Understanding (0-3 points):

Points

0 -- Did not understand anything.
1 -- Understood some conditions but not all.
2 -- Varied a condition to solve the problem.
3 -- Maintained all the conditions.

Means (0-4 points):

Points

0 -- Did not attempt anything or could not explain anything.
1 -- Gave a random guess.
2 -- Gave some thought but could not reach an answer or did not know what to do.
3 -- Had a plan or a means to find the solution and began to carry out the plan. Means was solution by exhausting other possibilities.
4 -- Had a plan and carried the plan to solution.

Solution (0-3 points):

Points

0 -- Did not have a solution.
1 -- Part of the solution was correct but with some modification of the conditions.
2 -- Found a wrong solution only because of a computation error.
3 -- Gave a correct solution--The problem cannot be done because the sum of the first 5 integers is greater than 9.

GO TO THE NEXT PAGE IN THE FOLDER.

Problem 2

Barry saw some men alongside a highway. One was holding a pole. Another was about 30 meters away from the pole. He was looking toward the pole through something which was on top of a three-legged stand. The stand looked very sturdy.

Barry has an art class at school. The students work on paintings which are set on three-legged easels. The easels never wobble.

Barry had his picture taken. He noticed that the camera was set on a three-legged stand. He asked the photographer how come. The photographer said that the stand held the camera so it was steady. Barry asked why she didn't use a stand with more legs so it would be even more steady. The photographer said that a stand with more than three legs would be less steady than a stand with three legs. Barry didn't understand why, but he believed her, since she seemed to know what she was talking about.

When Barry got home, he sat at the kitchen table to drink some milk. The chair was wobbly. He remembered what the photographer had told him. He got a saw and cut off one of the legs of the chair. The chair fell over.

What was wrong with Barry's reasoning? That is, why do you suppose that three-legged stands work so well sometimes and yet the three-legged chair didn't work? (And why do you suppose that the three-legged stands were steady, but the four-legged kitchen chair wasn't steady?) (Harnadek, 1979)

Write your answers here.

Scoring Scheme: Total points possible: 3.

Characteristics of a three-legged stand (0-1 point):

Group must have made some note of properties of a three-legged stand such as the weight is nearly equally supported by the three legs.

Characteristics of a four-legged stand (0-1 point):

Group must have made some note of properties of a four-legged stand such as the chair was made to have the weight equally distributed over four legs.

Relationship between the two--three-legged stand and a chair--and a conclusion (0-1 point):

Group must have tied the information together such as when one leg on the chair was cut off, the weight was no longer equally distributed among the three legs like a three-legged stand. The chair fell over because there was nothing to support the weight on the corner of the chair where the leg was cut off.

GO TO THE NEXT PROBLEM IN THE FOLDER.

Problem 3

You have been given the go-ahead to start a radio station for your school. What would you do to plan for the station? How would you decide what programs to broadcast and when the programs should be aired?

Write all of your ideas on this paper.

Scoring Scheme: Frequency of responses:

Tactical responses (count of all responses):

A response that is a feature of the station such as equipment (speakers or microphones), building, personnel (disc jockey, reporters, or weather person), or programs (music, sports, or announcements).

Strategical responses (count of all responses):

A response that indicates planning or making decisions in some way, such as asking people what they want, deciding on what is needed, setting up a schedule or plan of how the time is to be used, or identifying needs.

Scope and dimension (0-1 points):

Some mention of time requirements, plans, or steps to follow in setting up station.

Information (0-1 points):

Some note of seeking information, such as taking a survey or poll.

Resources and equipment (0-1 points):

Some mention of assembling necessary resources or what equipment is needed to operate a station.

Sequence of steps (0-1 points):

An order was given to the steps to follow.

AFTER YOUR GROUP HAS EXPLAINED WHAT YOU WOULD DO, GO TO THE NEXT PAGE IN THE FOLDER.

Problem 3 , page 2

List what information you would have to have in order to start and run a radio station.

1. Information (count of all responses):

2. The number of responses that are types of information (how to operate equipment or what people like to hear).

3. Equipment (count of all responses):

4. The number of responses that are types of equipment (speakers,

5. building, or disc jockey).

List what resources you would use to find the necessary informtion.

1. Resources (count of all responses):

2. The number of resources listed such as somebody who works at a station, library, or books.

3.

4.

5.

List the steps in the order you would follow them that you would take to decide what should be broadcast.

1. Decision steps (count all of responses):

2. The number of appropriate steps that would help to decide what should be broadcast, such as identify different types of music,

3. conduct a poll, determine which type of music people like, or decide on the time to broadcast programs.

4. Sequence (0-1 points):

5. The steps given are given an order.

GO TO THE NEXT PROBLEM IN THE FOLDER.

Note: The scoring scheme for this problem can be obtained by contacting the Agency for Instructional Television, Box A, Bloomington, IN 47402.

Problem 4

1

Jim's Spacecraft

Jim suddenly remembers that the Science Fair will begin soon. He hopes it is not too late to enter the contest! Jim wants to build a model of a spacecraft big enough to hold him. Jim has a large cardboard box in his garage. It is just perfect for the body of the spacecraft. The garage is also filled with wood, tools and gadgets.

Jim knows he probably does not have enough time to build a spacecraft alone. He has a lot to do and is eager to start.

When you have read the story, you may go on to the next page.

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The development of this material has been supported by funds from The Corporation for Public Broadcasting.

Jim decides to make a plan so the spacecraft will be finished before the Science Fair deadline. But first, what things might Jim want to know in order to set up a plan? Make a list of questions that he might ask:

1.

2.

3.

4.

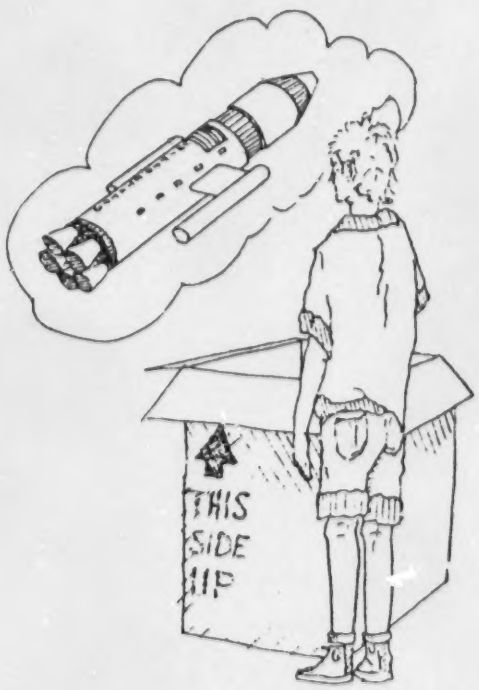
5.

When you finish, you may go on.

Now that Jim has some questions in mind, where might he go and who might he talk to in order to find some answers?

1. For example, how might Jim find out the Science Fair deadline? Write your ideas below:

2. How might Jim find out more about actual spacecraft so his model will look real? Write your ideas below:



When you finish, you may go on.

4

A good planner thinks ahead to the different things that must be done to build the spacecraft. Some of these things must be done before others. For example, Jim decides that one of the last jobs is to paint his spacecraft. But many other things must be done before! What are some of them? Write below what might be Jim's first step. You may then add as many steps as you wish:

1. A first step is:

2. A second step is:

3. A third step is:

4. A fourth step is:

5. A fifth step is:

When you finish, you may go on.

5

After Jim worked many hours on his project, he suddenly finds that the Science Fair deadline is sooner than he was told. He might not finish in time! What are some of the different kinds of things that he could do now? Write your ideas below. Number them as you go:

When you finish, you may go on.

Appendix D

Student Responses and Scores to Problems 1 and 2

Appendix D

Student Responses and Scores to Problems 1 and 2

Included in this appendix are the written responses given by each group to problem 1 (Table D1) and problem 2 (Table D2). The score given to each group is shown to the right of the response.

Table D1
Responses and Scores on Problem 1
by Group

Group	Response	Score			
		Und.	Means	Soln.	Total
115G1	Yes, there would be one in the last and two in the other four cups. (diagram)	1	3	1	5
115G2	Put two marbles in four cups and put one in the other.	1	3	1	5
115G3	No. We tried hard. We tried everything.	3	2	2	7
215G1	No. Because you can't use the same numbers in a cup. (diagram)	3	3	3	9
215G2	No. If you take the five lowest numbers it will equal to fifteen.	3	4	3	10
215G3	No. Because you would have to repeat the number in the cup.	3	3	3	9
315G1	No, you can't. (diagram)	3	3	2	3
315G2	No. Not enough marble to go in five cups.	3	3	3	9
315G3	No. (diagram)	3	3	2	8
126G1	No. Because five doesn't go into nine evenly. (diagram)	2	3	2	7
126G2	No. There aren't enough marbles. (diagram)	3	3	3	9
126G3	You add 1+2+3+1 1/2+2 1/2, which will add up to nine. (diagram)	2	4	1	7
226G1	Two in one cup, 1/2 in one cup, one in one cup, 2 1/2 in the other cup, 3 in one cup (diagram)	2	4	1	7
226G2	No. There is no possible way to put nine marbles into five cups without using the same number twice. (diagram)	3	3	2	8
226G3	No, because it is an uneven number.	3	2	2	7
326G1	Put five in one cup, zero in another, one in two of them, two in one cup. (diagram)	1	3	1	5
326G2	Split them in half. (diagram)	2	2	1	5
326G3	Zero in one cup, one in one cup, two in one cup, 3 3/4 in one cup, 3 1/4 in one cup.	1	4	1	6
136G1	No. You would have to have the same amount of marbles in some cups.	3	4	2	9
136G2	Yes. You cannot do it unless you cut them in half. (diagram)	3	4	2	9
136G3	No. Cup inside a cup (diagram)	3	3	2	8
235/6G1	No. Five doesn't go into nine evenly.	2	3	2	7
235/6G2	Yes. Because you can't divide nine by five.	2	3	1	6
235/6G3	No. Because if we put one in number one and two in number two and three in number three, we have three left. But we used the numbers one, two, and three, and we can't use them again. (diagram)	3	4	3	10

Table D2
Responses and Scores on Problem 2
by Group

Group	Response	Score			
		Properties 3 legs	Properties 4 legs	Concl.	Total
115G1	The chair had four legs and if you took one off the chair would have two on the other side and the sides would not be even. The camera had three legs that were not together; they didn't have to balance like the chair.	0	0	1	1
115G2	It does not matter how many corners there are; you just have to balance the chair.	0	0	0	0
115G3	The weight was uneven because the three-legged stand had even sides. And the four-legged chair didn't have even sides. One leg was cut off.	1	0	1	2
215G1	It's unbalanced.	0	0	0	0
215G2	It's not equally balanced because there are two legs on one side and one on the other.	0	0	0	0
215G3	When he sawed the kitchen chair it fell over because it was set up for a four-legged chair and wasn't centered right. But with a chair with three legs that are centered right it wouldn't fall over.	1	0	1	2
315G1	Because the legs were in wrong position.	0	0	0	0
315G2	The legs on a chair have to be in a certain place to stand up. If you cut off a leg on a camera stand, it would fall over.	0	0	1	1
315G3	You have to rearrange the legs or you'll fall.	0	0	0	0
126G1	He thought that an object could balance on three legs and not have meeting at a point because the object would be centered in the middle. (diagram)	1	0	0	1
126G2	Three-legged stands are steadier because they are set on an angle. The four-legged chair wouldn't be steady because the leg was uneven.	0	0	0	0
126G3	If you have 30 lbs. of weight on a tripod chair, you've got 10 lbs. of weight per leg. But if you have four legs you have 7.05 lbs. per leg. When you have more weight on one leg, that leg with more weight will be steadier because it will stick to your floor surface better.				

Table D2 (cont.)
Responses and Scores on Problem 2
by Group

Group	Response	Score			
		Properties 3 legs	Properties 4 legs	Concl.	Total
126G3 (cont.)	A three-legged stand has its legs in a triangle, plus they are at an outward angle. A tripod is wider on the bottom. The chair was bigger on top. (diagram)	1	1	0	2
226G1	A three-legged chair is more balanced than a four-legged chair with one cut off. (diagram)	0	0	0	0
226G2	If you had a four-legged stand and one leg was shorter, then it would wobble. And if you had a three-legged chair it would tilt one way and would not wobble.	0	0	0	0
226G3	You have to have two in front and one in the middle of the back.	0	0	0	0
326G1	Three-legged stand has three legs and point to the middle with a metal disk. Four-legged chair and if you cut off one leg the chair would be unbalanced.	0	0	0	0
326G2	There was too much space when he cut off the chair leg, but on the camera stand it was even space.	1	0	1	2
326G3	The chair could have been wobbly because one of the legs was uneven compared to the others. For the three-legged stands the legs are all centered. He must have thought that anything with three legs was steadier than something with four.	1	0	0	1
136G1	The legs are not placed right if you cut one off of a chair that used to have four legs.	0	0	1	1
136G2	Their weight has to be equally distributed over three points and they have to be in the right position. (diagram)	0	0	1	1
136G3	They were not even. (diagram)	0	0	0	0
235/6G1	A camera is lighter than a person.	0	0	0	0
235/6G2	An easel is like a traingle and that position holds it up, but a chair is like a square; if you take a leg away, it will fall.	0	0	0	0
235/6G3	Because the camera stand came out like this. (diagram) And the chair fell down because it was made for four legs not three.	0	0	1	1

Appendix E

Request for Participation

Appendix E

Request for Participation

Included in this appendix are the postcard that was sent to a random sample of 800 grade 5 and grade 6 teachers in Wisconsin asking if they would be interested in prticipating in an evaluation of THINKABOUT, and the letter sent to those teachers selected to have their students observed as they solved problems.

This April and May the WETN will be evaluating ways of better supporting the ITV series THINKABOUT. We invite you to take advantage of this opportunity and participate with us. Please help by answering the following questions and mailing this postage paid card today. Your prompt reply is appreciated.

1. Are you using THINKABOUT this year?

   ___Regularly ___Occasionally ___Never

2. Did you use THINKABOUT last year?

   ___Regularly ___Occasionally ___Never

3. Have your current students used THINKABOUT both last year and this year?

   ___Yes ___No

4. What grade are you teaching this year?

   _____5th_____6th_____other

5. Would you like to participate further in the evaluation of THINKABOUT?

   _____Yes_____No

WISCONSIN EDUCATIONAL TELEVISION NETWORK

Thank you!

Request Postcard

Letter Requesting the Observation of
Groups of Students

Wisconsin Educational Television and Radio Networks

7312 North Midvale Boulevard
Madison, Wisconsin 53705
Phone (608)263-0630

Arthur L. Mo...
Executive Director

Paul M. Norton
Deputy Director

Wisconsin Educational Television Network

WHA-TV, La Crosse
WHRM-TV, Wausau
WHWC-TV, Menomonie
WLEF-TV, Park Falls
WPNE-TV, Green Bay

Network Affiliates:
WDSE-TV, Duluth
WHA-TV, Madison
WMVS-TV, Milwaukee
WMVT-TV, Milwaukee

Wisconsin Educational Radio Network

WERN-FM, Madison
WHAD-FM, Delafield
WHHI-FM, Highland
WHLA-FM, La Crosse
WHRM-FM, Wausau
WHSA-FM, Brule
WHWC-FM, Menomonie
WERE-AM, Auburndale
WPNE-FM, Green Bay

May 1, 1981

The information you provided us on your use of the instructional television series THINKABOUT and your interest in participating in its evaluation is greatly appreciated. Our main purpose in evaluating THINKABOUT is to determine what support we can give teachers who are using it and how it can be better implemented.

One part of the evaluation will involve observing small groups of students as they solve problems. Of the 96 teachers who have volunteered to participate in the evaluation, you have been selected to be one of the nine who is being asked to be in this part of the evaluation. Three of the teachers have used THINKABOUT regularly for two years. Three of you have used THINKABOUT regularly for only this year. Three of you are not using THINKABOUT. We understand that you are using THINKABOUT this year and you are teaching grade 6.

What will be involved is:

To have three small groups of four students each observed as the group works on three problems. The groups will be randomly selected from your class. The time required for each group will be one hour.

For you to complete a questionnaire asking about your use of THINKABOUT and your instructional program. The estimated time to complete the questionnaire is 30 minutes.

For group scores on standardized achievement tests taken by your students to be supplied if available. We are only interested in group scores and not scores for individual students. Since students will be tested from nine different schools, we need some indication of how comparable students from different schools are on achievement.

The testing of the students will be done sometime between May 11 and May 22. Your participateion in the study will be kept confidential. The report of the evaluation will not identify any of the schools or teachers where data were collected. You will be sent a report of the evaluation and kept informed of any supplemental material that is prepared as a result of this study.

I will call you on May 6 to see if you are interested in being in this part of the study, and to answer any of your questions.

Sincerely,

Norman Webb

Norman Webb
Manager of Educational Research
Educative Services

Appendix F

Check of Agreement ot a Transcription

Appendix F

Check of Agreement of a Transcription

The transcription of the discussion of problem 1 by group 215G1 was done by two people to help ensure the transcriptions were accurate. The main transcription was done by the investigator who did all of the transcriptions. The check was done independently by another person.

Problem 1 215G1
Transcription check

"No, because nine isn't an even number."
"Yes..."
"In five cups?"
"Oh..."
"You figure it out."
"Thanks a lot."
"Well you were in the highest math group."
"You could put one marble in each cup."
"There would be four marbles left."
"Put two in each cup."
"There would be one left."
"Draw five cups. No, just draw the top of them."

"Now what?"
"I've got it...two, two, two, two..."
"No, there has to be a different number in each cup."
"Three each."
"...three left."
"You can't use one over again."
"Can too."
"There's only five in _____."

"Put...oh yeah, you can't use two."
"This is almost impossible."
"I figured it out."

"Just say no...our answer would just be no."

"One, two three...seven, no..."

"No, you don't."
"Yes, I do."
"You do not."
"Three, two, one..."
"That's six."
"Oh, three...no."
"That's nine already."
"Put one..."

"It's impossible."
"Oh, no it's not."
"Yes, it is."
"It's impossible."

"No, because nine isn't an even number."
"Yes...
"...with five cups."
"Oh."

"One marble in each cup."
"But then there would be four left."
"Put two in each cup."
"Then there would be one left."
"Draw five cups."

"No, just draw the top of them."
"Now would be..."
"I got it. Two, two, two, two, one."
"No, it has to be a different number in each cup."
"Three each...three."
"Three left."
"You can't use one over again."

"There is only five there...six."
"You erase the one."
"Six."

"You figured it out."
"Is this..."
"Just say no."

"Our answer will just be no."
"Three, seven."
"No."
"Yeah."
"No, you don't."

"You do not."
"Three, two, one."
"That's six."

"That's nine already."
"Put one"
"One or two"
"That's nine already."
"It's impossible."
"No it's not."
"Yes, it is."
"It's impossible."

"It is not."
"It is too."
"Three..."
"Why don't you guys give up?
It's impossible."
"It is not."
"Why give up?"
"It is too."
"Is not."
"Is too."
"Oh, quit acting like _____."
"It just asks you if it can, and I say
it can't."
"Okay, put Linda's answer down."
"It can't be done."
"Can you use the same number over
again?"
(I'm just listening here.
It's up to the group.)

"It can't be done."
"It says, can nine marbles...."

"It's asking you if it can, not
telling you it can."
"Yes, it says a different number in
each cup."
"It says can--can it be done, though.
No. It's impossible."

"Yeah, it is."
"Linda, you're not thinking."
"I am too."
"It's almost like trying to put
a square block into a round circle."
"That's easy--square block _____."

"Okay..."
"Make just round things."
"No."

"So what, Linda?"
"Alright..."
"Use five."
"I got it."

"No you don't...it's impossible."

"It is not."
"It is too."
"Three, it's not impossible."

"It's impossible."
"It is not."

"It is too."
"It is not."
"It is too."

"It just asks you if it can, and I say
it can't."
"Okay, put Linda's answer down."
"See, it can't be done."
"Can you use the same number over
again?"

"With a different number."
"It can't be done."
"It says, can nine marbles be...(reads
problem)"
"It's asking you if it can. It's not
telling you if it can."
"Yes, it says a different number in
each cup."
"It says can it be done."

"Can it be done though?"
"No. It's impossible."
"Just put..."
"Yes, it is."

"It's almost like putting a square block
in a round circle."
"That's easy--a square box whole."
"Or, how many cups?"

"No, just make round things."
"No."

"Alright."
"Five."
I got it."
"Gads."
"No you don't."
"It's impossible."
"Six."

"The only thing I can use is a two on one."
"You've got to be able to use some."
"Four."
"No."
"Six."
"All it's asking you is if it can be done. Just say no. Just put no."

"You've got to try everything before you give up."
"We did."
"We did."
"No, we didn't."
"Not enough."
"Mr. Brain here is going to figure it out."
"No."
"Zero."
"Hey, we have to put a marble in each cup."

"Yeah, you can't put zero marbles in each cup."
"Can nine marbles be distributed in five cups with a different number...it doesn't say you have to put at least one in.... it doesn't, it doesn't."
"George, you're weird."
"Who's fault is that?"
"Three...now put three."
"No, put four, then three...that makes seven."
"Five..."
"I guess we will have to..."
"He put a zero before."
"Come here! Give me that... I'm going to figure this out."
"So."
"Oh, the cups are too big."
"I don't care."
"Wait."
"Why can't it be ten?"
"Boy, that's really hard."
"It don't work."

"It will."
"No, it's impossible."

"We have our answer. It can't be done."
"It's impossible."

"Okay, I can use two in those."

"I got to be able to use..."
"Four, six..."

"Just say no."
"Put no."
"You have to try everything before you give up."
"We did."
"We did."
"No, you didn't."
"Not enough."
"Mr. Brain here is going to figure it out."
"No."
"Number zero."
"Hey...yeah."

"You have to put a marble in each cup."
"You can't put zero marbles in a cup."

Rereads problem..."It doesn't say you have to put one in...at least one in. It doesn't. It doesn't."

"George, you're weird."

"Now put a three."
"No, put a four...
"Next is a three...that's seven."
"Five."
"I guess we will have to..."
"We put a zero before."
"Come here! Give me that pencil. I'm going to figure this out."
"So."
"Your cups are too big."
"I don't care."
"Wait."
"Why cant it be ten?"
Why, that's really hard."
"It don't work."
"Just put no."

"It's impossible."
"No."
"We have our answer...it can't be done."

"It's impossible."

"George, it's going to drive me insane trying to figure it out."
"I never give up. You guys give up too easy."

"Since when don't you?"
"Yeah, usually you throw a fit."
"You scream at me...."
"George, it can't be done."
"It can't be done."
(Did you put your answer down, then?)

"Yeah, no."
(Okay, did you explain why?)
"No."

"We tried it."
"I mean, because you can't use the same number over...it's impossible because you could...like you could do it if you could use the same number over again. But you can't. It says use a different number of marbles in each cup."

"If we're wrong, it's your fault George."

"Does that make sense? Because you can't...."
"Yeah, that makes sense."
(Okay, here's the next problem.)

"George, it's going to drive me insane to figure it out."
"I never give up."

"You guys give up too easy."
"Since when don't you?"
"Listen, you throw a fit."

"George, it can't be done."
"It can't be done."
(Did you put your answer down? Did you explain why?)

"No, no."
"Well I never..."
"Because we tried it."
"Well because you can't use the same number over. It is impossible...you could use...like you could do it if you could use the same number over again. But you can't. It says to use a different number of marbles in each cup."
"Wait."
"If we are wrong it is your fault George."
"Gee whiz."
"Does that make sense? Because you can't use the same numbers in a cup."